

**SELF-EVALUATION REPORT FOR EVALUATION OF
RESEARCH ORGANIZATIONS IN THE SEGMENT OF HIGHER
EDUCATION INSTITUTIONS IN YEAR 2025**

HIGHER EDUCATION INSTITUTION NAME:

University of Chemistry and Technology, Prague

COMPANY REGISTRATION NUMBER (CRN):

CZ60461373

THE LIST OF EVALUATION UNITS IN MODULE 3:

Modul 3 Faculty of Chemical Technology

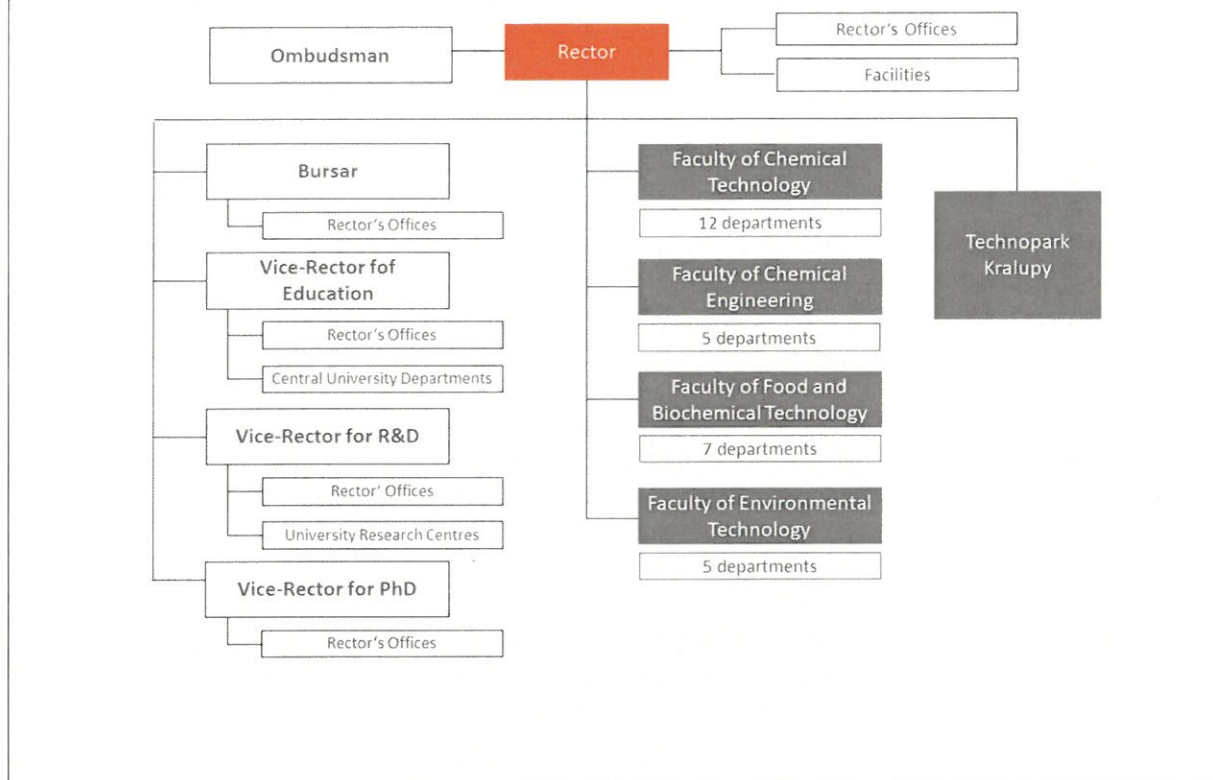
Modul 3 Faculty of Chemical Engineering

Modul 3 Faculty of Food and Biochemical Technology

Modul 3 Faculty of Environmental Technology

Modul 3 Technopark Kralupy

ORGANIZATIONAL STRUCTURE OF THE HIGHER EDUCATION INSTITUTION



HIGHER EDUCATION INSTITUTION WEBSITE (HTML LINK): www.vscht.cz

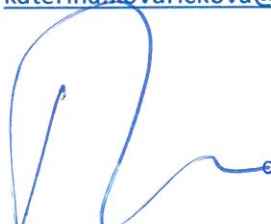
THE HIGHER EDUCATION INSTITUTION CONTACT PERSON

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VYSOKÁ ŠKOLA
 CHEMICKO-TECHNOLOGICKÁ V PRAZE
 Technická 5, 166 28 Praha 6
 961/2

Signature (Rector), stamp

Introductory information about the evaluated higher education institution

The HEI briefly introduces itself. The organizational chart, the position of the HEI within the research, development and innovation system and the system of HEIs in the Czech Republic may be commented on, the mission and vision, the size of the HEI, the number and focus of the units evaluated will be briefly presented.

Maximum 500 words.

Description:

The University of Chemistry and Technology, Prague (UCT Prague), is a leading Czech public university specializing in technical chemistry, chemical and biochemical technologies, material and chemical engineering, food chemistry, and environmental studies. Tracing its origins to 1806, UCT Prague has evolved into a prominent center for education and research in Central Europe.

UCT Prague enrolls over 3,600 students annually and offers a wide range of programs across its four faculties, focusing on various aspects of chemistry, technology, and engineering. The evaluated units include all faculties and their respective departments, each dedicated to specialized fields within the broader domain of chemical sciences and technology.

- Faculty of Chemical Technology
Departments include especially chemistry disciplines (Inorganic Chemistry, Organic Chemistry), chemical technology (Inorganic Technology and Organic Technology) and materials (such as Metals, Polymers, and Glass and Ceramics), among others.
- Faculty of Environmental Technology
Focuses on areas such as Water Technology, Environmental Engineering and Sustainable Fuels.
- Faculty of Food and Biochemical Technology
Encompasses Biotechnology, Food processing, Food Analysis and Nutrition, and Dairy, Fat and Cosmetics departments.
- Faculty of Chemical Engineering
Includes Analytical Chemistry, Physical Chemistry, Chemical Engineering departments and others.

In addition to these faculties, UCT Prague hosts various university research and education centers, central university departments, and administrative units. One of the major University Research Centres is the Technopark Kralupy. It is an applied research centre focusing on innovations in construction chemistry and related material fields.

UCT Prague is recognized as a research-intensive institution. The university generates approximately half of its income from scientific, research, and innovation activities, underscoring its significant role in the research and development landscape.

UCT Prague's commitment to excellence in education, research, and innovation in the field of chemistry and technology is evident through its extensive academic programs, active participation in international collaborations and cooperation with industrial partners. The university aims to foster a positive social environment and contribute to societal development through scientific advancements.

SWOT ANALYSIS

Strengths

1. Open communication between the Academic Senate and the university leadership
2. The compactness of UCT Prague allows for easier and more efficient agreement/collaboration when defining and implementing priorities with institutional impact. High centralisation of service department functions, existence of uniform procedures and rules for all components of UCT Prague
3. Strong research team and high expertise of staff in both basic and applied research and excellent technical equipment of laboratories and Central Laboratories
4. Collaboration developed with foreign universities and research organisations
5. Extensive availability of scientific information resources
6. Strong support for mobilities from the International Office
7. Successful Modern Chemistry Lesson project, promoting chemistry as a promising field at primary and secondary schools; provision of laboratory teaching for selected secondary schools; organisation of Chemistry Olympiads
8. Collaboration with students and staff on the university's popularisation activities (large group of collaborating students; well-designed motivational and educational system)
9. Good reputation of our experts among journalists (for chemistry, we are the first choice for journalists in almost all cases)
10. Historically strong collaboration with the industrial sector. Technopark Kralupy UCT Prague as a meeting point for science and industry.
11. System set up for internal evaluation and quality management
12. A functional system for a safe environment at UCT, including the reporting of inappropriate behaviour and the establishment of a central safety point (ombudsman)

Weaknesses

1. The computerisation and digitalisation of agendas is not complete, only partial electronic circulation of documents
2. High time burden on students compared to other universities in the Czech Republic (less time for other activities can be considered as disadvantage by an applicant). High study failure rates.
3. Insufficient financial support for doctoral students and low scholarships.
4. High administrative burden on academic staff
5. Insufficient space for R&D development
6. Occasional limited collaboration between foreign and Czech students
7. Low number of licensed technologies
8. Quality is not precisely specified in all areas of activity. The update of quality indicators is not ready
9. Low employee interest in conceptual and strategic documents. Insufficient communication in this area
10. No rules are set for the use of AI in teaching
11. Insufficient awareness among incoming students and staff about the university's code of conduct and ethical rules
12. Actual attacks on university property – physical/cyber attacks/threats – fatal consequences (human, financial losses)

Opportunities

1. Better use of the university's know-how in sustainability, circular economy, and advanced technology topics with high added value (IT, pharmaceuticals, biotechnology, advanced materials).
2. HR Award – implementation of action plan measures to increase the attractiveness of the university as an employer for foreign academic and research staff.
3. Benefits from collaboration within the Research Universities Association (RUA) and the transfer of best practices according to the recommendations of the IAB UCT
4. Diversification of budget income – strengthening of revenue from collaboration with industry, lifelong learning income, fees from self-paying students, increased use of international project calls, not only for research
5. Openness to external evaluation of R&D, activation of the IAB UCT as an advisory body
6. Expansion of laboratory space; expansion of academic cooperation
7. Support for international mobility programmes, hosting of foreign experts, support for postdoc internship
8. Increasing interest from researchers in spin-off and start-up companies
9. Use of outputs and know-how from university collaborations within development programmes and functional platforms to improve the quality of activities (teaching quality, pedagogical competencies, sustainability, project management).

Threats

1. Instability of the external environment in general (conflicts in Ukraine, Israel, energy crisis, changes in requirements and rules from the MEYS for public universities...)
2. Limited financial resources for the renewal and operation of equipment infrastructure and for the modernisation of buildings (including an improvement in energy performance) unless supported under EU operational programmes
3. Limited financial resources for the renewal and operation of equipment infrastructure and for the modernisation of buildings (including an improvement in energy performance) unless supported under EU operational programmes
4. Decrease in state financial support for grant agencies
5. Lack of projects ensuring long-term research funding and the associated uncertainty of human resources in research
6. Insufficient funds for the replacement and purchase of modern instrumentation
7. Limited access to international consortia/associations as a small university
8. Limited access to European funds due to non-membership of European universities
9. Lack of investors and industrial partners for commercialisation
10. Difficult-to-predict legislative changes in science and research
11. Negative perception of chemistry in society
12. Actual attacks on university property – physical/cyber attacks
13. Increasing living costs in Prague

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Chemical Technology

FORD: 1 - Natural sciences

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The Faculty of Chemical Technology (FCT) consists of eleven departments and one joint laboratory of UCT Prague and the Czech Academy of Sciences, namely:

- Department of Inorganic Chemistry
- Department of Inorganic Technology
- Department of Metals and Corrosion Engineering
- Department of Glass and Ceramics
- Department of Solid State Chemistry
- Department of Organic Chemistry
- Department of Organic Technology
- Department of Polymers
- Department of Solid State Engineering
- Laboratory of Inorganic Materials
- Department of Informatics and Chemistry
- Department of Chemical Technology of Monument Conservation

At the end of the monitoring period the numbers of students were as follows: 673 in bachelor's programs, 264 in follow-up master's programs, and a total of 937 students in undergraduate studies.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

The total number of doctoral students at the end of 2023 was 284 (in both presence and combined form). The total number of employees (associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers, etc.) was converted to FTE and is shown in the following table (**Table 3.1.1**).

FCT is a research-oriented faculty renowned for its basic and applied research in 3 main fields: Chemistry; Chemistry and technology of materials including biomaterials; Chemistry and chemical technologies including pharmaceutical technologies. The following topics were studied during the period 2019-2023:

- Development of new types of metal alloys, ceramic materials and polymers for structural use
- Bioceramics, bioglasses, alloys and polymer materials for use in medicine and pharmacy
- Corrosion and degradation of metal, glass, ceramic and polymer materials
- Composite materials, optimization of their properties and their resistance in various chemical environments
- High-temperature superconductors, materials for optoelectronics and magnetic recording
- New applications of microanalytical methods and methods of structural and phase analysis of materials
- Physico-chemical methods of surface modification of solids
- Chemical stability of materials of cultural and artistic monuments and methods of their protection
- Physico-chemical and ecological aspects in the preparation and production of materials. Waste and secondary raw materials processing
- Design and optimization of chemical and electrochemical reactors
- Systems for energy conversion and storage
- Kinetics of catalyzed and uncatalyzed reactions
- Preparation and characterization of new types of catalysts
- Modeling of reactors and simulation of chemical-technological processes
- Processing of waste from chemical production
- Modern dosage forms, mechanisms of their behavior and unit operations of their production
- Synthesis of special substances for the pharmaceutical, cosmetic and food industries
- Principles of chemical and electrochemical synthesis of new substances and their new structural segments
- Research in the field of chemoinformatics, computer-aided drug design and biomolecular modeling
- Research on 2D nanomaterials
- Novel systems for photoredox catalysis based on flavins
- Supramolecular systems based on calixarene derivatives
- Chiral zwitterionic phases for HPLC

Strategically, the research is aimed at sustainable development while maintaining the level of life comfort. It provides new materials and substances for technical use, protection of human health and preservation and improvement of the environment, as well as new or innovative technologies. Unique cooperation between scientists in the areas of materials chemistry and the history of art and crafts makes it possible to contribute to the protection of objects of cultural heritage.

FCT cooperates both with the Czech and foreign industries and provides the results of its research to companies in chemical, material-oriented, electrotechnical, automotive and energy sectors. Cooperation takes place both in the form of joint projects and contract research. Furthermore, this cooperation opens the way for the education of scientists, researchers and technicians needed in the industry. As a result, the applied research performed at FCT brings new knowledge, but also finance and is also beneficial to society.

Table 3.1.1 - Staffing per FTE²

| Academic/ Professional position | Total / Of which women | | 2021 | 2022 | 2023 | Total |
|--|------------------------|---------------|--------------|---------------|---------------|---------------|
| | 2019 | 2020 | | | | |
| Professor | 21,2 / 0 | 20,9 / 0 | 19,4 / 0 | 19,1 / 0 | 20,7 / 0 | 101,3 / 0 |
| Associate Professor | 32,7 / 7,4 | 31,7 / 8,3 | 28,9 / 8,4 | 29,4 / 8,5 | 26,2 / 8,7 | 148,9 / 41,3 |
| Assistant Professor | 72,5 / 24,6 | 76,5 / 27,4 | 75,8 / 26,8 | 73,2 / 25,8 | 71,3 / 25,7 | 369,3 / 130,3 |
| Assistant | 2,8 / 0,8 | 2 / 0 | 2 / 0 | 2 / 0 | 2 / 0 | 10,8 / 0,8 |
| R&D Personnel ³ | 116,2 / 56 | 127,4 / 57,7 | 155,8 / 65,1 | 163,7 / 70,2 | 156,4 / 74,2 | 719,5 / 323,2 |
| Researchers in other categories ⁴ | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Technical and economic staff ⁵ | 36,5 / 29,1 | 38,3 / 29,7 | 38,1 / 29,4 | 36 / 28,3 | 35,5 / 27,9 | 184,4 / 144,4 |
| Scientific, research and development staff involved in teaching activities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Early career researchers ⁶ | 41,2 / 16,4 | 47,7 / 18 | 57,9 / 20,3 | 65,2 / 22,4 | 64,8 / 24,5 | 235,6 / 85,2 |
| Total ⁷ | 281,9 / 117,9 | 296,8 / 123,1 | 320 / 129,7 | 323,4 / 132,8 | 312,1 / 136,5 | 1534,2 / 640 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 4 | 0 | 6 | 0 | 9 | 0 | 6 | 0 |
| Associate Professor | 0 | 0 | 6 | 1 | 9 | 3 | 11 | 3 | 6 | 1 | 7 | 0 |
| Assistant Professor | 2 | 1 | 43 | 14 | 24 | 9 | 4 | 2 | 10 | 4 | 0 | 0 |
| Assistant | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ⁹ | 96 | 47 | 63 | 28 | 16 | 8 | 7 | 4 | 4 | 2 | 2 | 0 |
| Researchers in other categories ¹⁰ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹¹ | 2 | 1 | 4 | 4 | 7 | 5 | 18 | 14 | 5 | 4 | 3 | 2 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹² | 6 | 2 | 18 | 5 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹³ | 100 | 49 | 116 | 47 | 62 | 25 | 46 | 23 | 34 | 11 | 18 | 2 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 1 | 0 | 4 | 0 | 9 | 0 | 8 | 0 | 2 | 0 |
| Associate Professor | 0 | 0 | 2 | 0 | 15 | 3 | 10 | 4 | 5 | 2 | 1 | 0 |
| Assistant Professor | 1 | 0 | 37 | 17 | 32 | 13 | 11 | 6 | 5 | 2 | 0 | 0 |
| Assistant | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ¹⁵ | 103 | 51 | 78 | 34 | 22 | 10 | 9 | 4 | 10 | 5 | 8 | 0 |
| Researchers in other categories ¹⁶ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹⁷ | 3 | 2 | 5 | 2 | 9 | 6 | 14 | 14 | 7 | 5 | 1 | 1 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹⁸ | 6 | 2 | 66 | 25 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| Total ¹⁹ | 107 | 53 | 123 | 53 | 83 | 32 | 54 | 28 | 35 | 14 | 12 | 1 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Table 3.1.4 – Students

| Type of study | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Undergraduate | 564 | 344 | 532 | 297 | 530 | 295 | 605 | 347 | 673 | 394 | 1757 | 1055 |
| Master's ²⁰ | 361 | 207 | 307 | 183 | 272 | 156 | 261 | 132 | 264 | 131 | 971 | 533 |
| Doctoral | 218 | 112 | 229 | 115 | 243 | 122 | 258 | 130 | 272 | 139 | 280 | 148 |
| Lifelong Learning Courses | 26 | 17 | 68 | 41 | 88 | 57 | 61 | 31 | 66 | 48 | 309 | 194 |
| Total | 1169 | 680 | 1136 | 636 | 1313 | 630 | 1185 | 640 | 1275 | 712 | 3317 | 1930 |

Table 3.1.5 - Study programmes in Czech/English

| Type of study programme | Total ²¹ / Of which professional study programmes | | | | | | | | | | | |
|---------------------------|--|---|------|---|------|---|------|---|------|---|-------|---|
| | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
| Undergraduate | 15 | 0 | 16 | 0 | 13 | 0 | 10 | 0 | 9 | 1 | 17 | 1 |
| Master's | 18 | 0 | 18 | 0 | 11 | 0 | 9 | 0 | 10 | 1 | 19 | 1 |
| Doctoral | 44 | 0 | 42 | 0 | 44 | 0 | 46 | 0 | 46 | 0 | 48 | 0 |
| Lifelong Learning courses | 6 | 5 | 6 | 5 | 6 | 5 | 7 | 6 | 5 | 4 | 7 | 6 |
| Total | 83 | 5 | 82 | 5 | 74 | 5 | 72 | 6 | 70 | 6 | 91 | 8 |

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

3.1.6 – R&D&I capacities

| R&D&I field | FORD | FORD share [%] | Predominant type of research | Total share of industry group [%] |
|---|---|----------------|-------------------------------------|-----------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | 0 | Zvolte položku. | 53 |
| | 1.2 Computer and information sciences | 1 | Basic Research | |
| | 1.3 Physical sciences | 1 | Basic Research | |
| | 1.4 Chemical sciences | 49 | Balanced basic and applied research | |
| | 1.5 Earth and related environmental sciences | 1 | Basic Research | |
| | 1.6 Biological sciences | 1 | Zvolte položku. | |
| | 1.7 Other natural sciences | 0 | Basic Research | |
| 2. Engineering and Technology | 2.1 Civil engineering | 2 | Balanced basic and applied research | 43 |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | 1 | Basic Research | |
| | 2.3 Mechanical engineering | 1 | Balanced basic and applied research | |
| | 2.4 Chemical engineering | 5 | Balanced basic and applied research | |
| | 2.5 Materials engineering | 28 | Balanced basic and applied research | |
| | 2.6 Medical engineering | 1 | Basic Research | |
| | 2.7 Environmental engineering | 1 | Balanced basic and applied research | |
| | 2.8 Environmental biotechnology | 0 | Zvolte položku. | |
| | 2.9 Industrial biotechnology | 0 | Zvolte položku. | |
| | 2.10 Nanotechnology | 3 | Balanced basic and applied research | |
| | 2.11 Other engineering and technologies | 1 | Balanced basic and applied research | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | 2 | Basic Research | 3 |
| | 3.2 Clinical medicine | 0 | Zvolte položku. | |
| | 3.3 Health sciences | 1 | Basic Research | |
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | 0 | Zvolte položku. | 0 |
| | 4.2 Animal and Dairy science | 0 | Zvolte položku. | |
| | 4.3 Veterinary science | 0 | Zvolte položku. | |
| | 4.4 Other agricultural sciences | 0 | Zvolte položku. | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | 0 | Zvolte položku. | 0 |
| | 5.2 Economics and Business | 0 | Zvolte položku. | |
| | 5.3 Education | 0 | Zvolte položku. | |

| | | | | |
|----------------------------|--|-------|-------------------------------------|-------|
| | 5.4 Sociology | 0 | Zvolte položku. | |
| | 5.5 Law | 0 | Zvolte položku. | |
| | 5.6 Political science | 0 | Zvolte položku. | |
| | 5.7 Social and economic geography | 0 | Zvolte položku. | |
| | 5.8 Media and communications | 0 | Zvolte položku. | |
| | 5.9 Other social sciences | 0 | Zvolte položku. | |
| 6. Humanities and the Arts | 6.1 History and Archaeology | 1 | Balanced basic and applied research | 1 |
| | 6.2 Languages and Literature | 0 | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | 0 | Zvolte položku. | |
| | 6.4 Arts (arts, history of arts, performing arts, music) | 0 | Zvolte položku. | |
| | 6.5 Other Humanities and the Arts | 0 | Zvolte položku. | |
| Total | | 100 % | - | 100 % |

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Employees as well as students of FCT received a number of individual and other prestigious R&D&I awards. Professors and associate professors also participated as editorial board members of prestigious international scientific journals. They also have become members in professional societies. Many invited lectures were given by FCT staff abroad at universities and conferences. On the other hand, there were also many important foreign experts visiting FCT. These experts presented invited lectures in new lecture hall, which was built exclusively for these purposes. FCT staff was also involved of staff in the evaluation of both national and European programs. FCT staff also obtained internationally recognized awards, invited lectures, panel memberships, etc. As can be seen in the following tables.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the award | Awarding institution |
|---|---|---------------------------------|
| Ondřej Jankovský, Prof. Ph.D. Ing. | ECERS Young Scientist Award 2021 | European Ceramic Society |
| Soňa Hříbalová, Ing., Ph.D. | Fulbright-Masaryk Scholarship 2023 | J. William Fulbright Commission |
| Soňa Hříbalová, Ing., Ph.D. | YCN (Young Ceramists Network) Committee Membership 2020-today | European Ceramic Society |
| Zdenek Sofer, Prof. Ing. Ph.D. | The President of the Czech Science Foundation award 2019 | Czech Science Foundation |
| Petra Ménová, Ing. Ph.D. | Alfred Bader Prize for Bioinorganic and Bioorganic Chemistry 2020 | Czech Science Foundation |
| Polák Peter, Ing. Ph.D. | J. M. Lehn Prize (1. place) for Chemistry 2019 | French Embassy |
| Cibulka Radek, prof. Ing. Ph.D. | Chemistry Europe Fellow 2022 | Chemistry Europe |

| | | |
|---------------------------------|---|---|
| Cibulka Radek, prof. Ing. Ph.D. | Rudolf Lukeš Prize 2022 | Czech Chemical Society |
| Lada Dolejšová Sekerová Ing PhD | Werner von Siemens Prize for dissertation thesis 2021 | Siemens |
| Bohumír Dvořák, doc. Ing. CSc. | The personality of Czech chemistry 2023 | Chemical Industry Association of the Czech Republic |

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of scientific journal, ISSN |
|---|---|
| Zdeněk Sofer, Prof. Ph.D. Ing. | FlatChem, ISSN 2452-2627 |
| Ondřej Jankovský, Prof. Ph.D. Ing. | High-Temperature Materials, ISSN 3006-9971 |
| Zdenek Sofer, Prof. Ing. Ph.D. | Small Methods, ISSN: 2366-9608 |
| Karel Bouzek, prof. Dr. Ing. | Journal of Applied Electrochemistry, ISSN:1572-8838 |
| Karel Bouzek, prof. Dr. Ing. | Electrochemical Science Advances, ISSN: 2698-5977 |
| Karel Bouzek, prof. Dr. Ing. | Electrochimica Acta, ISSN: 0013-4686 |
| Jaroslav Kvíčala. prof. Ing. CSc. | Journal of Fluorine Chemistry, ISSN: 0022-1139 |
| Andrea Brancale, PhD | Antiviral research, ISSN 0166-3542 |
| Jan Merna, Prof. Ing. Ph.D. | Journal of Macromolecular Science, Part A: Pure and Applied Chemistry ISSN: 1060-1325 |
| Martin Pumera, Prof. | Applied Materials Today, ISSN 2352-9407 |

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Invited lecture title | Name of host institution, or name of conference or event | Year |
|---|---|---|------|
| Petr Zámostný, prof. Ing. Ph.D. | Microstructure and dissolution of carrier systems comprising poorly soluble drugs | Improving Drug Solubility: Recent Advances in Pharmaceutical Technology | 2023 |
| Ondřej Jankovský, Prof. Ph.D. Ing. | Unique properties of layered inorganic materials | European Ceramic Society ECERS 2022 | |
| Zdenek Sofer, Prof. Ing. Ph.D. | Crystal growth and applications of new 2D dielectric materials | DRC 2023 | 2023 |
| Pavel Lhoták, prof. Ing. Ph.D. | Unusual Reactivity of Macrocycles - How to Destroy Calixarenes? | Calix 2022 - 16th International Conference on Calixarenes, New | 2022 |

| | | | |
|--------------------------------------|--|--|------|
| | | Orleans, USA | |
| Jaroslav Kvičala, prof. Ing. Ph.D. | Chiral and fluorous. Recyclable precatalysts for enantioselective alkene metathesis and Suzuki-Miyaura coupling. 1 | 9th European Symposium on Fluorine Chemistry, Warsaw, 2019 | 2019 |
| Radek Cibulka, prof. Ing. Ph.D. | Deazaflavin-based strong reducing agents produced by light | Molecules and light. Krakow | 2023 |
| Martin Veselý, Ing. Ph.D. | Applications of 2D materials as a catalyst support | EHT Zurich | 2022 |
| Michal Kohout, prof. Ing. Ph.D. | Gradient supercritical fluid chromatography coupled to mass spectrometry with a gradient flow of a make-up solvent | 33rd International Symposium on Chromatography, Hungary | 2022 |
| Jarmila Zbytovská, assoc. prof., Dr. | Cerosomes: Novel Ceramide Liposomes for Skin Barrier Recovery (virtual lecture) | NWC Nano Boston Conference, USA | 2020 |
| Karel Bouzek, prof. Dr. Ing. | Alkaline Water Electrolysis – Separator, MEA, Cell and Stack | 74th Annual Meeting of the International Society of Electrochemistry, Lyon, France | 2023 |

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

| Name, surname and title(s) of the lecturer | Lecturer's employer at the time of the lecture | Invited lecture title | Year |
|--|--|---|------|
| Prof Paul Weiss | UCLA, USA | Understanding and Controlling Charge, Heat, and Spin at Atomically Precise Interfaces | 2023 |
| Prof. Teruhisa Ohno | Kyushu Institute of Technology, Japan | Development of an ultra-efficient hydrogen peroxide generation and OH radical generation system PCN derivative | 2023 |
| Prof. Peter Mallon | Stellenbosch University, South Africa | Electrospun Copolymer Nanofibers: Design, Processing, and Structures for Targeted Applications | 2023 |
| Dr. Naresh Kumar | ETH Zurich | Nanoscale chemical imaging of 2D materials using tip-enhanced optical spectroscopy | 2022 |
| Prof. Robin A. Hutchinson, | Queens University, Kingston, Ontario, Canada | Modelling and measurement of kinetics of industrially relevant radical polymerization processes: A perspective of chemical engineer and teacher | 2022 |
| Prof. Dr. Devendra Kumar Namburi | University of Glasgow, UK | Superconductivity and Dark Matter: Is there a connection? | 2022 |

| | | | |
|--------------------------|---|--|------|
| prof. Polina Volovitch | Chimie-ParisTech, France | Corrosion and Surface Treatment in Solar Energy Industrial Segment | 2022 |
| Prof. Hans-Ulrich Laasch | University of Chester, UK | Medical devices from a healthcare professional's perspective | 2021 |
| Prof. Dr. J.-U. Sommer | Institute Theory of Polymers, Leibniz Institute of Polymer Research, Dresden, Germany | Branched and Dendritic Polymers in Solution: A Theoretical Perspective | 2020 |
| Dr. Steffen Brinckmann | Max-Planck-Institut f. Eisenforschung GmbH, Německo | Data analysis in tribology and indentation at the micro- and nanoscale | 2019 |

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the project/programme call research | Name of the authority/guarantor of the project/programme call | Year |
|---|---|--|---------------|
| Jan Merna, prof. Ing. Ph.D. | Polymer Division IV projects evaluation | IUPAC | 2019- 2023 |
| Petr Slepíčka, prof. Ing. Ph.D. | P108 - Materials Sciences and Engineering | Czech Science Foundation | 2021- 2023 |
| Zdenek Sofer, Prof. Ing. Ph.D. | P106- Technical Chemistry | Czech Science Foundation | 2023 |
| Zdenek Sofer, Prof. Ing. Ph.D. | ERC-StG | Horizon Europe | 2021 |
| Zdenek Sofer, Prof. Ing. Ph.D. | DFG - German Research Foundation | DFG - evaluation of standard projects | 2020 |
| prof. Ing. Václav Švorčík, DrSc. | P108 - Materials Sciences and Engineering | Czech Science Foundation | 2019- 2020 |
| Pavel Lhoták, prof. Ing. CSc. | P207 - Chemical and Biochemical Transformations | Czech Science Foundation | 2019- 2023 |
| Barbora Doušová, doc. Ing., CSc. | P210 - Geophysics, Geochemistry, Geology nad Mineralogy, Hydrogeology | Czech Science Foundation | 2019- 2023 |

| | | | |
|------------------------------|-----------------------------|---|------|
| Martin Veselý, Ing. Ph.D. | HORIZON-MSCA- 2023-PF-01 | The European Research Executive Agency (REA) | 2023 |
|------------------------------|-----------------------------|---|------|

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

Table 3.3.1 demonstrates the faculty's ability to maintain stable income from public sources. The number of projects from the most significant grant providers Czech Science Foundation (GAČR) and Technology Agency of Czech Republic (TAČR) show that the faculty is intensively engaged in both basic and applied research. A large number of projects were supported at FCT, from which the following 10 prestigious national or international projects (with focus on young researchers) were selected:

1) Project: Excellence in Regenerative Medicine,

Co-Applicant (CTU): Nikola Slepíčková Kasálková, Assoc. Prof. Ing. Ph.D.

Applicant: Institute of Experimental Medicine CAS, Pavla Jendelová, doc. RNDr. , Ph.D.

Solution period: 2023-2028

Call: OJ JAK Excellent Research, Ministry of Education, Youth and Sports

Project budget: 19 mil EUR

Project aims: The project aims to create an excellent research center in regenerative medicine focused on developing, testing, and applying innovative methods for restoring and replacing tissues and organs that have lost their function due to aging, disease, damage, or genetic defects. The excellence and uniqueness of the project lie in the fact that its research objectives aim to restore tissues whose damage cannot yet be treated or whose regenerative ability is significantly limited. These include primarily damage to the nervous tissue of the brain and spinal cord, retinal degeneration, small-diameter vessel replacements that are still missing on the market (i.e., in clinical practice), and last but not least, active healing of chronic wounds. The project includes research at the cellular and tissue level and preclinical studies, emphasizing the multidisciplinary integration of scientific and clinical practice. The research has significant application potential. The project is comprehensively focused, brings basic to applied research results, and bridges the gaps between basic scientific knowledge and its practical use. The sub-objectives include the development of new therapeutic methods that could be transferred to clinical practice. In addition, the project contributes

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

to developing expertise and skills in the scientific community by training and mentoring a new generation of scientists and technologists. This project also raises public awareness of the importance of regenerative medicine and its potential to solve some of today's most pressing health problems.

Application potential:

Novel biosensing approach holds promise for detecting various DNA sequences given the knowledge of complementary sequences. Furthermore, SERS-ML could be directly applied to elucidate bacterial communication.

2) Project: The chemistry in two dimensions - beyond graphene

Applicant: Zdenek Sofer, Prof. Ing. Ph.D.

Solution period: 2019-2023

Call: EXPRO, Czech Science Foundation

Project budget: 2 mil. EUR

Project aims: The single element layered materials beyond graphene attract huge attention in last years, but their chemistry and possibilities of chemical modifications remain, up to date, almost unknown. The project will focus on the synthesis, exfoliation and chemical modification of layered elements beyond graphene (silicene, germanene, phosphorene, arsenene and antimonene). Compared to graphene, these materials exhibit non-zero bandgap in the single layer form. The synthesis strategies will explore „top-down“ approach based on exfoliation methods as well as „bottom-up“ methods based on molecular beam epitaxy of monolayers. The chemical modification will be investigated using radical, nucleophilic and electrophilic reactions. The properties and reactivity of derivatives will be studied in detail. The non-covalent derivatization will be investigated in order to improve environmental stability of exfoliated materials. The chemistry performed on the surfaces of crystals will provide information about derivatization on an atomic scale using combination of microscopic and spectroscopic methods.

Application potential:

2D silicon has huge application potential in lithium and sodium batteries thanks to enormous capacity and 2D morphology can reduce the issues of electrode expansion.

3) Project: Next Generation of 2D Monoelemental Materials

Applicant: Zdenek Sofer, Prof. Ing. Ph.D.

Solution period: 2021-2026

Call: ERC-CZ, Ministry of Education, Youth and Sports

Project budget: 2 mil. EUR

Project aims: 2D nanomaterials beyond graphene are currently at the forefront of materials research. Compared with pristine graphene, its inorganic analogues possess many unique properties, such as a non-zero band-gap and photoluminescence. This group of layered materials is very broad and encompasses both metallic and semiconducting materials. The diversity between the properties of such materials can be controlled by several methods, including substitutional doping and covalent functionalisation. Monoelemental materials beyond graphene remain largely unexplored despite the rapidly growing number of recent publications that show the urgent need for research in this area. The primary challenge is to develop a method for the synthesis of single-element materials at scales suitable for in-depth characterisation, chemical derivatisation and exploration of their application potential. Therefore, 'bottom-up' techniques, so vital for characterising chemical and physical properties, and 'top-down' techniques, essential for chemical derivatisation, need to be developed. The goals of this project are to synthesise single-element materials from the 14th and 15th

groups, to explore methods of their covalent and non-covalent modification, and to apply these newly discovered materials to energy storage, catalysis, optoelectronics and environmental remediation applications.

Application potential:

Monoelemental 2D materials has big application potential in electronic and energy storage. The use of these materials for solid state photodetector and lithium batteries were successfully demonstrated.

4) Project: High-strength and water-resistant MOC composites with secondary fillers: contribution of 2D carbon-based nanomaterials and their combinations

Applicant: Ondřej Jankovský, Prof. Ph.D. Ing.

Solution period: 2023-2027

Call: JuniorStar project, Czech Science Foundation

Project budget: 1 mil EUR

Project aims: The main aim of the project is to develop high-strength, water-resistant, CO₂-neutral, and completely recyclable magnesium oxychloride cement composites with 2D carbon nanoadditives and secondary fillers as a new group of materials for Portland cement replacement. The processes involved in Portland cement (PC) production account for around 7% of global CO₂ emissions. Reactive magnesia-based cements have comparable properties to PC, but much lower environmental impact. In particular, magnesium oxychloride cement (MOC) composites, with their CO₂-neutral footprint, could provide the basis for a novel route to sustainable construction materials. However, there are challenges to be overcome, the main one of which is the poor water resistance of MOC, which results in the rapid degradation of its mechanical properties. The novelty of our approach lies in incorporating combinations of 2D carbon-based nanomaterials and selected secondary waste fillers into the MOC matrix in order to obtain high-strength and water-resistant composites.

Application potential: Enhancing the material and physical properties of the MOC matrix in the way proposed should result in a considerable broadening of the application potential of the proposed composites. Developed composites will represent an ecological alternative to Portland cement, especially for indoor use, where their relatively low water resistance does not pose a major problem.

5) Project: Reaction networks at phase interfaces for dynamic self-assembly

Applicant: Petr Kovaříček, Ing. Ph.D.

Solution period: 2022-2026

Call: JuniorStar project, Czech Science Foundation

Project budget: 1 mil EUR

Project aims: The JuniorSTAR project 22-11299M is a five-year 1 M€ grant focusing on covalently dynamic self-assembly at phase interfaces to yield materials for optoelectronic devices and heterogeneous catalysts. The research aims to develop methodologies for instructed autonomous formation of functional materials, in which their functionality (e.g. catalysis, conductivity, charge recombination etc.) serves as the driving principle for the material formation. This approach obviates paramount challenges in the development of such materials by allowing the system to form the functioning structure by itself. The interdisciplinarity of the project combines organic synthesis, materials science, solid-state physics/physical chemistry and spectroscopy, which defines the area of expertise of the PI and the group but also provides exclusive background in which participating researchers and students are trained. The duration and budget of the grant allows the PI to establish an independent research group at the dept. of Organic Chemistry of UCT by hiring skilled staff and doctoral students. Together with undergraduate students and the internees, the group will contribute

to building thriving research environment at UCT, increase its attractiveness at international level and perform cutting-edge science.

Application potential:

Catalytic processes reduce the energy and raw material requirements of any chemical production. If it proves feasible to create a catalyst tailored to a particular chemical reaction, and it should be, then it should be possible to produce catalysts principally to custom order for a wide range of users.

6) Project: Development of actin polymerization inhibitors as potential migrastatics

Applicant: Pavla Perlíková, Ing., Ph.D.

Solution period: 2023-2027

Call: JuniorStar project, Czech Science Foundation

Project budget: 1 mil EUR

Project aims: Migrastatics represent a new class of drugs with great potential to improve the outcome of current cancer treatment strategies by inhibiting the metastatic behaviour of cancer cells. Actin polymerization is one of the potential targets for migrastatics. The aim of the project is to develop new compounds with antimetastatic activity based on inhibition of actin polymerization (direct or indirect). Analogues of cytochalasins, that directly inhibit actin polymerization, will be developed based on virtual screening and fragment growing. Inhibitors of ARPC1, a subunit of the Arp2/3 complex and actin polymerization regulator, will be developed including specific inhibitors of ARPC1 isoforms. Finally, PROTACs targeting the Arp2/3 complex and its subunits will be synthesized and their effect on cancer cell invasion will be studied. The screening of the new compounds will be performed in close collaboration with Prof. Jan Brábek (BIOCEV, Vestec, Czech Republic). The project will provide novel insights into the role of actin polymerisation and its regulation in cancer cell invasiveness, and will also provide compounds that could serve as a starting point for further development of metastatic drugs.

Application potential:

The project focuses on basic research; however, the biologically active compounds identified during the project could serve as lead compounds for further pharmaceutical development as cancer drugs.

7) Project: Synthesis and Property Tuning of Layered Low-Dimensional Materials Beyond Graphene – Utilization in Fundamental Research of Heterogeneous Catalysts

Applicant: Martin Veselý, Ing. Ph.D.

Solution period: 2023-2027,

Call: JuniorStar project, Czech Science Foundation

Project budget: 1 mil EUR

Project aims: This project is focused on preparation and chemical modification of layered materials based on Si, Ge, and SixGe(1-x) mixtures. The aim is to prepare 2D hundreds-of-micron-sized sheets and nanometer-sized quantum dots (QDs) with high optical and chemical uniformity. Functionalization of the prepared uniform low-dimensional materials allows the application of these materials in fundamental research of phenomena typical for heterogeneous catalysis: I) Study of the exclusive effect of 2D support on the enhanced activity of metal nanoparticles and II) Assessment of accessibility and interconnectivity of pores space in conventional catalysts using 0D QDs with varying size as a pore space probe. The key points are: a) Synthesis and chemical modification of layered materials based on Si, Ge, and SixGe(1-x) mixtures; b) Assessment of chemical and optical uniformity; c) Platinum nanoparticle deposition on 2D material; d) Study of the metal-2D support interaction; e) Mass transport visualization in pore space.

Application potential:

This project paves designing of more efficient metal supported catalysts through study of specific interactions leading to catalytic synergy effects. Further, the implemented methodology will lead to cheaper characterization of low-dimensional materials used as a catalyst support.

8) Project: Nanocrystallography of molecular crystals

Co-applicant: Jan Čejka, Ing., Ph.D.

Applicant: Institute of Physics of the AS CR, v.v.i., Lukáš Palatinus, Dr. rer. nat.

Solution period: 2021-2025

Call: EXPRO, Czech Science Foundation

Project budget: 2 mil EUR

Project aims: Structure analysis of molecular crystals is an important and powerful tool in many fields of chemistry and structural biology. Its power is, however, limited, if only nano- or microcrystals of the studied materials are available. The best method to study structures of such materials is electron diffraction. However, even this method suffers from a number of limitations, like the low accuracy of lattice parameters, difficulties with accuracy of structure models or inability to determine reliably the absolute structure of chiral compounds. These limitations severely restrict its applicability to many interesting scientific problems and, consequently, the general ability of scientists to understand molecular structures. The project aims at removing these limitations. A set of protocols, methods, and programs are developed, with the ambition to set new standards in the field and to make electron crystallography of molecular crystals a fully developed and generally accepted method of first choice for analysis of nano- and microcrystalline molecular materials.

Application potential:

Significant advances in electron crystallography by enhancing crystal structure determination, automating data collection, and refining absolute configuration analysis were made. These improvements have implications in broad range of fields from mineralogy to organic chemistry and pharmacology.

9) Project: Next-generation membrane technologies for sustainable exploitation of seawater brine resources: transition towards a circular blue industry

Applicant: Karel Bouzek, prof. Dr. Ing.,

Solution period: 2022-2026

Call: Horizon Europe

Project budget: 3 mil EUR

Project aims: The MSCA-DN project “EXBRINER/Next-generation membrane technologies for sustainable exploitation of seawater brine resources: transition towards a circular blue industry” is designed to the development of innovative membrane technologies at water-energy-resources nexus for a sustainable valorization of desalination wastes. It is combined with training of a new generation of early-stage researchers in Membrane Engineering by means of a synergic cross-fertilization of complementary competences through an inter-sectoral and multidisciplinary Network, composed by 7 European Universities, 3 Research Centers and 4 Industrial Companies (two of them are SMEs) from 8 EU Countries, all with recognized excellence in the field of membrane technology. Based on more than 10 years of joint experience in Erasmus Mundus Joint Doctorate/Master in Membrane Engineering, the Consortium shares a common infrastructural platform - with worldwide recognized excellence - for implementing highly competitive and jointly-supervised training and research activities. Those activities, oriented towards societal needs of strategic relevance for European Union, cover a large spectrum of “market-relevant” applications such as: sustainable desalination for water

supply, exploring alternative mineral sources for a secure supply of critical raw materials, low-carbon power technologies based on Salinity Gradient energy.

Application potential:

Application potential of this project is mainly utilization of sea water resources, including harvesting energy of mixing concentrated and diluted streams. Application aspect is additionally strongly supported by the fact, the project was from the beginning planned as a collaborative, including industrial partners active in the field of the membrane separation processes. The research outcomes are validated already in the course of the project during individual secondments at the commercial partners.

10) Project: Next Generation Alkaline Membrane Water Electrolysers with Improved Components and Materials

Applicant: Karel Bouzek, prof. Dr. Ing.,

Solution period: 2020-2023

Call: Horizon Europe

Project budget: 4 mil EUR

Project aims: The aim of the NEXTAEC was development of next generation alkaline electrolyzer with a performance comparable to a good PEM electrolyzer or better without the use of noble metals.

In the proposed project, an alkaline electrolyzer will be developed around a new membrane concept. The membrane is an ion-solvating membrane. It is a polymer, which dissolves the electrolyte of the electrolyzer (aqueous potassium hydroxide). Like an ion-exchange membrane it is nonporous and it can therefore, in contrast to a porous diaphragm, be as thin as an ion exchange membrane. The absence of noble metals makes it possible to roll out the technology in the multi GW scale that is needed in the green transition away from the dependence fossil fuels.

Application potential:

Application potential of the results achieved is high. The components developed within the project were implemented by the industrial partner of the project NEL Hydrogen in an industrial electrolysers stack and tested. As NEL participated in the entire project and provided feedback to the consortium, implementation of the selected components to the commercial cells is to be expected in the near future.

Table 3.3.1 Projects supported by public funds

| In the role of beneficiary | | | | | | |
|----------------------------|---|--------------------------------|---------|----------|----------|-----------|
| Provider ²⁵ | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Novel MAterial and Process Design for ReVerse ElectrolysisMARVEL | 1015 / 40 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | Atomically thin pristine germanane with diverse chemical functionalities for energy storage: sodium/lithium ion batteries | 0 / 0 | 0 / 0 | 0 / 0 | 622 / 25 | 1841 / 73 |
| European comission | Next Generation Alkaline Membrane Water Electrolysers with Improved Components and Materials | 0 / 0 | 165 / 7 | 781 / 31 | 937 / 37 | 1597 / 63 |

| | | | | | | |
|---------------------------|--|-------------------|-------------------|------------------|-------------------|--------------------|
| European comission | Materials for next generation alkaline electrolyzer | 0 / 0 | 3417 / 135 | 1675 / 66 | 3765 / 149 | 3451 / 136 |
| European comission | UGMNanoSens | 1983 / 78 | 753 / 30 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | To link or to make? N-Heterocycles in two dimensions | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1017 / 40 |
| European comission | Development of Anion-Exchange Membranes for Hydrogen Producing Alkaline Electrolysers | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1213 / 48 |
| European comission | Development of advanced bioglass-polymer scaffolds for OSTEOCHONdral interface tissue regeneration | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 418 / 16 |
| European comission | 2D TM-LDH (Layered double hydroxide) with low dimensions materials (MXene, graphene, and TMC) as flexible solid state and electrochemical supercapacitors and electrocatalyst. | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 236 / 9 |
| European comission | Development of two-dimensional transition metal compound based efficient electrocatalyst for green H2 production | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1611 / 64 |
| European comission | | 2998 / 118 | 4335 / 171 | 2456 / 97 | 5324 / 210 | 11384 / 449 |
| Foundation | HETEROGENEOUS ORGANOCATALYSIS ON SELFASSEMBLED ORGANIC SEMICONDUCTORS | 0 / 0 | 0 / 0 | 0 / 0 | 4408 / 174 | 2105 / 83 |
| Foundation | Nanocatalysis in two dimensions - novel efficient catalysts for clean energy | 344 / 14 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Foundation | | 344 / 14 | 0 / 0 | 0 / 0 | 4408 / 174 | 2105 / 83 |
| GACR | Nanostructured cellulose-based scaffolds with tunable properties for tissue engineering | 3265 / 129 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Preparation and characterization of thin layers and nanostructures with specific magnetic properties | 1947 / 77 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Research and development of high performance composites containing biomass ash | 1790 / 71 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Processing of innovative iron-based intermetallics by mechanical alloying and spark plasma sintering | 2790 / 110 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Advanced preparation of catalytically active oxides on metal supports using combination of plasma sputtering and chemical methods | 2824 / 111 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Environmental impact of noble metal nanoparticles | 3043 / 120 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Layered transition metal dichalcogenides nanostructures for electrocatalysis | 1281 / 51 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | The role of nonstoichiometry and nanosizing in material properties of metal oxides | 1173 / 46 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Mechanical properties of RNA and DNA structural building blocks | 1356 / 53 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |

| | | | | | | |
|------|--|------------|------------|------------|---------|-------|
| GACR | Novel photocathode and photoanode materials for solar water splitting | 2330 / 92 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Modular Synthesis of New Fischer Biscarbene Complexes, their Structural Features and Synthetic Applications | 1654 / 65 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Preparation and characterization novel self-reporting and self-healing Al-alloys | 1093 / 43 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Janus nanoparticles for catalysis and membrane processes | 2694 / 106 | 2694 / 106 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | The synthesis and exploration of chromogenic and fluorogenic chiral calixarenes and related compounds | 988 / 39 | 988 / 39 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Hybrid organosilica nanomaterials for heterogeneous catalysis of enantioselective reactions | 1991 / 79 | 1991 / 79 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Preparation of pyrene-based semiconducting materials | 2646 / 104 | 2629 / 104 | 51 / 2 | 0 / 0 | 0 / 0 |
| GACR | Oxidative photocatalytic systems with flavinium salts for direct C-H functionalizations | 1255 / 50 | 1270 / 50 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Mechanochemical indicators | 2076 / 82 | 1951 / 77 | 155 / 6 | 0 / 0 | 0 / 0 |
| GACR | Partially and fully sintered ceramics – processing, microstructure, properties, modeling and sintering theory | 1500 / 59 | 1450 / 57 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | MODIFICATION OF BRANCHED POLYOLEFINS BY POLAR FUNCTIONALITIES | 1361 / 54 | 1336 / 53 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Chemical modification of conjugated polymers for reversible, light-triggerable conductivity switching | 1697 / 67 | 1697 / 67 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Reactive magnesia cements-based composites with selected admixtures and additives | 2375 / 94 | 2406 / 95 | 2406 / 95 | 0 / 0 | 0 / 0 |
| GACR | Honeycomb like functionalized microporous polymers | 2240 / 88 | 2240 / 88 | 2240 / 88 | 0 / 0 | 0 / 0 |
| GACR | Electrochemistry of Pt - P oxoacids interface as a key to understanding of high temperature PEM fuel cells performance | 1576 / 62 | 1576 / 62 | 1576 / 62 | 0 / 0 | 0 / 0 |
| GACR | Bioaccessibility and environmental interaction of antimony near busy traffic nodes | 1996 / 79 | 1692 / 67 | 1413 / 56 | 213 / 8 | 0 / 0 |
| GACR | Calixarene derivatives with mixed bridging units | 1328 / 52 | 1328 / 52 | 1328 / 52 | 0 / 0 | 0 / 0 |
| GACR | Advanced magnesium alloys with highly suppressed flammability, high corrosion resistance and superior strength | 2848 / 112 | 2848 / 112 | 2848 / 112 | 0 / 0 | 0 / 0 |
| GACR | Organic photoredox catalysis in reductive transformations: new area for flavin derivatives | 1521 / 60 | 1728 / 68 | 1721 / 68 | 0 / 0 | 0 / 0 |
| GACR | Integrated design methodology of nanoformulation processes for (trans-)dermal delivery of actives | 3151 / 124 | 3169 / 125 | 3138 / 124 | 0 / 0 | 0 / 0 |

| | | | | | | |
|------|--|-------------|------------|------------|------------|------------|
| GACR | In-situ analysis of foam layer behavior at the batch-melt interface using laboratory-scale melter vessel | 1367 / 54 | 1367 / 54 | 1367 / 54 | 0 / 0 | 0 / 0 |
| GACR | Non-equilibrium thermodynamics of solid/gas interfaces in high temperature solid oxide cells | 1326 / 52 | 1451 / 57 | 1463 / 58 | 0 / 0 | 0 / 0 |
| GACR | Photochemical Modification of 2D Materials | 2001 / 79 | 2001 / 79 | 2001 / 79 | 0 / 0 | 0 / 0 |
| GACR | Metal surface modification - new generation of icephobic materials | 1561 / 62 | 1892 / 75 | 2207 / 87 | 0 / 0 | 0 / 0 |
| GACR | The chemistry in two dimensions - beyond graphene | 15762 / 622 | 8748 / 345 | 8592 / 339 | 8376 / 330 | 8256 / 326 |
| GACR | Smart magnetic materials: from bulk systems towards "spinterface" | 0 / 0 | 3188 / 126 | 3188 / 126 | 3188 / 126 | 0 / 0 |
| GACR | High-performance composites containing layered nanomaterials | 0 / 0 | 1992 / 79 | 1992 / 79 | 1992 / 79 | 0 / 0 |
| GACR | Q-carbon, preparation of unique forms of carbon nanostructures | 0 / 0 | 2318 / 91 | 2318 / 91 | 2318 / 91 | 0 / 0 |
| GACR | Phase equilibria, variable stoichiometry and physical properties of transition metal oxides | 0 / 0 | 1570 / 62 | 1570 / 62 | 1570 / 62 | 0 / 0 |
| GACR | Advanced nanostructured membrane-electrode assembly with the improved mass and charge transport for PEM water electrolysis | 0 / 0 | 2280 / 90 | 2392 / 94 | 2403 / 95 | 0 / 0 |
| GACR | Chemistry of phenoxathiin-based thcalixarenes and related compounds | 0 / 0 | 1485 / 59 | 1485 / 59 | 1485 / 59 | 0 / 0 |
| GACR | Advanced oxide based semiconductor photoelectrodes for solar energy conversion and water treatment | 0 / 0 | 2801 / 110 | 2911 / 115 | 2963 / 117 | 0 / 0 |
| GACR | New metallurgy for new „natural alloys“ | 0 / 0 | 3148 / 124 | 3148 / 124 | 3148 / 124 | 0 / 0 |
| GACR | Two-dimensional layered transition metal dichalcogenides/ nanostructured carbons composites for electrochemical energy storage and conversion | 0 / 0 | 2981 / 118 | 2520 / 99 | 2520 / 99 | 0 / 0 |
| GACR | Layered material-based micromachines: Towards Biomedical and Environmental Applications | 0 / 0 | 2272 / 90 | 2232 / 88 | 2272 / 90 | 0 / 0 |
| GACR | Dendrimer-Protected Metal Alloy Catalyst Incorporated into Graphene for Hydrogen Evolution Reaction in Polymer Electrolyte Membrane Water Electrolyser | 0 / 0 | 2557 / 101 | 2463 / 97 | 2426 / 96 | 0 / 0 |
| GACR | 2D Layered Metal Phosphorous Trichalcogenides for Energy Conversion and Storage | 0 / 0 | 2609 / 103 | 2975 / 117 | 2975 / 117 | 0 / 0 |
| GACR | Cell interaction with periodic surface nanostructures | 0 / 0 | 0 / 0 | 2360 / 93 | 2360 / 93 | 2360 / 93 |
| GACR | MXenes: plasmon-assisted surface modification and properties tuning | 0 / 0 | 0 / 0 | 4233 / 167 | 4072 / 161 | 4072 / 161 |
| GACR | Design of nanocrystalline composite alloys with high entropy and controllable properties | 0 / 0 | 0 / 0 | 2528 / 100 | 2576 / 102 | 2492 / 98 |

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|------|--|-------|-------|-----------|------------|------------|
| GACR | Novel umpolung strategy using flavin covalent organocatalysis | 0 / 0 | 0 / 0 | 1795 / 71 | 2050 / 81 | 2022 / 80 |
| GACR | Tailoring flavins for organic photocatalysis | 0 / 0 | 0 / 0 | 2451 / 97 | 1988 / 78 | 1988 / 78 |
| GACR | Novel chiral ion-exchangers for chromatographic enantioseparations | 0 / 0 | 0 / 0 | 1512 / 60 | 1536 / 61 | 1536 / 61 |
| GACR | Plasmon induced excited spin state trapping in spin-crossover complexes | 0 / 0 | 0 / 0 | 1330 / 52 | 2662 / 105 | 2662 / 105 |
| GACR | Development of advanced bioabsorbable Zn-based materials using powder-metallurgy techniques | 0 / 0 | 0 / 0 | 1718 / 68 | 1966 / 78 | 1966 / 78 |
| GACR | Advanced reagents for (asymmetric) nucleophilic fluorination | 0 / 0 | 0 / 0 | 2137 / 84 | 2565 / 101 | 2565 / 101 |
| GACR | Enamelled Archaeological Objects - Archaeometry Contribution to the Knowledge of Production Technologies | 0 / 0 | 0 / 0 | 0 / 0 | 1977 / 78 | 2021 / 80 |
| GACR | Hybrid materials and advanced structures for mimicking natural photosynthesis | 0 / 0 | 0 / 0 | 0 / 0 | 2452 / 97 | 2452 / 97 |
| GACR | Organized biopolymer nanopatterns constructed by replication | 0 / 0 | 0 / 0 | 0 / 0 | 2466 / 97 | 2466 / 97 |
| GACR | Modular approach towards chiral membranes for scalable enantioseparation of racemic drugs | 0 / 0 | 0 / 0 | 0 / 0 | 3050 / 120 | 3332 / 131 |
| GACR | Preparation, characterization, and utilization of hybrid MOF-MeNPs organic/inorganic nanocomposites | 0 / 0 | 0 / 0 | 0 / 0 | 1420 / 56 | 1602 / 63 |
| GACR | Controlled synthesis of carbon nanotubes through mechanically interlocked carbon nanobelts | 0 / 0 | 0 / 0 | 0 / 0 | 1004 / 40 | 1528 / 60 |
| GACR | Reaction networks at phase interfaces for dynamic self-assembly | 0 / 0 | 0 / 0 | 0 / 0 | 7614 / 300 | 4058 / 160 |
| GACR | Using Artificial Intelligence to Design New Bioactive Compounds in the Research of G Protein-Coupled Receptors | 0 / 0 | 0 / 0 | 0 / 0 | 1493 / 59 | 1493 / 59 |
| GACR | Ignition-resistant magnesium alloys for aviation applications with tailored composition and microstructure | 0 / 0 | 0 / 0 | 0 / 0 | 2375 / 94 | 3167 / 125 |
| GACR | Pt-based intermetallic alloy catalysts for improved performance of high-temperature PEM fuel cells with reduced Pt loading | 0 / 0 | 0 / 0 | 0 / 0 | 1184 / 47 | 1652 / 65 |
| GACR | Impulse excitation as an unconventional method for monitoring phase changes and microstructure evolution during thermal loading of materials | 0 / 0 | 0 / 0 | 0 / 0 | 1622 / 64 | 1598 / 63 |
| GACR | New generation of conducting polymers-derived materials for sun-light energy utilization and storage | 0 / 0 | 0 / 0 | 0 / 0 | 1464 / 58 | 1953 / 77 |
| GACR | New ODS steel structure for extreme environments using the ultrasonic dispersion of nano-oxides in combination with SLM and PPS | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1761 / 69 |

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|---------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| GACR | Sintered silicides as the future tool materials | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3017 / 119 |
| GACR | High-strength and water-resistant MOC composites with secondary fillers: contribution of 2D carbon-based nanomaterials and their combinations | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 4947 / 195 |
| GACR | Two-dimensional transition-metal dichalcogenides – new concept of synthesis and activation for functionality enhancement | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3245 / 128 |
| GACR | Study of key factors influencing the efficiency of photoelectrochemical cells using sunlight for synthesis reactions and water purification | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3029 / 119 |
| GACR | Development of actin polymerization inhibitors as potential migrastatics | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 5021 / 198 |
| GACR | Redox and photochemical properties of polypyridyl-based biosensors | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 756 / 30 |
| GACR | Modular approach towards chiral membranes for scalable enantioseparation of racemic drugs | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3188 / 126 |
| GACR | Merging photochemistry and electrochemistry in flavin-based redox catalysis | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2538 / 100 |
| GACR | Chalcogen analogues of calix[n]arenes as novel macrocycles for supramolecular chemistry | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1476 / 58 |
| GACR | Preparation, characterization, and utilization of hybrid MOF-MeNPs organic/inorganic nanocomposites | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2076 / 82 |
| GACR | Synthesis and Property Tuning of Layered Low-Dimensional Materials Beyond Graphene – Utilization in Fundamental Research of Heterogeneous Catalysts | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 7237 / 285 |
| GACR | Plasmon assistance in dual organic electrochemistry | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2532 / 100 |
| GACR | | 79806 / 3148 | 77653 / 3063 | 81764 / 3225 | 87745 / 3461 | 98064 / 3868 |
| Ministry of culture | Stable artificial patinas of copper alloys | 706 / 28 | 742 / 29 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of culture | Development of Adhesive Techniques in Textile Conservation | 843 / 33 | 828 / 33 | 736 / 29 | 0 / 0 | 0 / 0 |
| Ministry of culture | Technology of Treatment and Identification of Degradation Processes of Ceramic Finds from Hradčany Palaces - Methods of Restoration and Conservation of Porous and Dense Ceramics and Porcelain | 1759 / 69 | 1607 / 63 | 1611 / 64 | 1463 / 58 | 0 / 0 |
| Ministry of culture | Methodology of corrosivity classification of indoor environments for lead collection objects | 2149 / 85 | 2218 / 87 | 2295 / 91 | 2156 / 85 | 0 / 0 |
| Ministry of culture | Biodiversity of black and white photographic and cinematographic materials in the czech archives and the methods of their disinfection | 3107 / 123 | 3183 / 126 | 3148 / 124 | 2998 / 118 | 0 / 0 |

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|--|---|-------------------|--------------------|---------------------|---------------------|---------------------|
| Ministry of culture | Conservation of archaeological textiles | 0 / 0 | 464 / 18 | 804 / 32 | 1024 / 40 | 0 / 0 |
| Ministry of culture | Accessibility, conservation and preventive care of diazotypic records in the funds and collections of memory institutions in the Czech Republic | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2161 / 85 |
| Ministry of culture | | 8564 / 338 | 9042 / 357 | 8594 / 339 | 7641 / 301 | 2161 / 85 |
| Ministry of Education, Youth and Sports | Future materials | 362 / 14 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Next Generation of 2D Monoelemental Materials | 0 / 0 | 10054 / 397 | 46092 / 1818 | 10118 / 399 | 10178 / 401 |
| Ministry of Education, Youth and Sports | Composite TiO ₂ - active coke based photocatalyst for water and air purification | 2129 / 84 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Nano particulate photocatalysts embedded in hydrophobic matrices for treatment of turbid wastewater containing non-polar, non-biodegradable compounds | 1189 / 47 | 2020 / 80 | 1930 / 76 | 548 / 22 | 0 / 0 |
| Ministry of Education, Youth and Sports | ANALYSIS OF FOAMING – CRITICAL BATCH-TO-GLASS CONVERSION PROCESS | 1373 / 54 | 1373 / 54 | 1373 / 54 | 1373 / 54 | 0 / 0 |
| Ministry of Education, Youth and Sports | Two-Dimensional Nanomaterials for Application in Electronic | 553 / 22 | 1757 / 69 | 1757 / 69 | 1757 / 69 | 0 / 0 |
| Ministry of Education, Youth and Sports | 9th bilateral Czech-Austrian Scientific Seminar: New trends in photo and electro catalysis | 138 / 5 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | New trends in photo and electro catalysis | 0 / 0 | 323 / 13 | 162 / 6 | 0 / 0 | 214 / 8 |
| Ministry of Education, Youth and Sports | 10th bilateral Czech-Austrian scientific workshop: New trends in photo and electro catalysis | 0 / 0 | 0 / 0 | 162 / 6 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | 11th bilateral Czech-Austrian scientific workshop: New trends in photo and electro catalysis | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 214 / 8 |
| Ministry of Education, Youth and Sports | Next Generation of 2D Monoelemental Materials | 0 / 0 | 0 / 0 | 35778 / 1411 | 10118 / 399 | 10178 / 401 |
| Ministry of Education, Youth and Sports | Surfaces of silicate glass; characterization, structure, and modification. Cooperation with Centre of excellence FunGlass. | 0 / 0 | 1370 / 54 | 1572 / 62 | 1572 / 62 | 1585 / 63 |
| Ministry of Education, Youth and Sports | SEARCHING FOR NOVEL 2D NANOMAGNETS FOR APPLICATIONS IN NANOELECTRONIC AND SPINTRONIC | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1734 / 68 |
| Ministry of Education, Youth and Sports | Experimental and mathematical analysis of primary glass-forming melt properties, gas evolution, and their relation with primary foam production. | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1519 / 60 |
| Ministry of Education, Youth and Sports | Influence of Microbial Activity on DGR Canister Lifetime | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1813 / 72 |
| Ministry of Education, Youth and Sports | | 5744 / 226 | 16897 / 667 | 88825 / 3504 | 25486 / 1005 | 27435 / 1082 |
| Ministry of Health | Functional Nanorobots for Navigated Combination Cancer Therapy | 0 / 0 | 0 / 0 | 3475 / 137 | 5439 / 215 | 5539 / 219 |
| Ministry of Health | | 0 / 0 | 0 / 0 | 3475 / 137 | 5439 / 215 | 5539 / 219 |

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|---------------------------------------|---|------------------|-------------------|--------------------|--------------------|-------------------|
| Ministry of Industry and Trade | Photocatalytic active wallpaper | 1067 / 42 | 653 / 26 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | | 1067 / 42 | 653 / 26 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Methodology for assessing the functionality of antimicrobial photoactive surfaces from a public health protection perspective | 0 / 0 | 0 / 0 | 2874 / 113 | 2874 / 113 | 0 / 0 |
| Ministry of the Interior | The development of new materials for the detection and effective warning before ionizing radiation | 1811 / 71 | 2547 / 100 | 2392 / 94 | 1260 / 50 | 0 / 0 |
| Ministry of the Interior | Express and portative detection of prohibited substances using innovative techniques: flexible and chiral SERS, selective surface extraction, artificial neural networks. | 0 / 0 | 0 / 0 | 6954 / 274 | 6954 / 274 | 6932 / 273 |
| Ministry of the Interior | | 1811 / 71 | 2457 / 100 | 12221 / 482 | 11089 / 437 | 6932 / 273 |
| Other foreign | Asialoglycoprotein receptor mediated hepatocyte targeting | 0 / 0 | 0 / 0 | 158 / 6 | 504 / 20 | 488 / 19 |
| Other foreign | INTEROCEAN Exploitation of deep sea deposits | 286 / 11 | 263 / 10 | 52 / 2 | 93 / 4 | 22 / 1 |
| Other foreign | | 286 / 11 | 263 / 10 | 211 / 8 | 597 / 24 | 510 / 20 |
| TACR | Joint implant with bioactive antibacterial and antibiofilm layer to prevent infection and promote its osteointegration | 4340 / 171 | 4340 / 171 | 4340 / 171 | 4340 / 171 | 0 / 0 |
| TACR | Cancer immunotherapy: rejuvenation of anti-cancer response by immune checkpoint blockade using novel multifunctional nanoparticle to block CTLA-4 and eliminate ICER | 0 / 0 | 0 / 0 | 2942 / 116 | 2942 / 116 | 2942 / 116 |
| TACR | Electrochemical treatment of waste concentrates from membrane separation processes | 1848 / 73 | 2608 / 103 | 761 / 30 | 0 / 0 | 0 / 0 |
| TACR | Ceramic composite filters for the decontamination of waters contaminated with pesticides and heavy metals | 0 / 0 | 1165 / 46 | 2295 / 91 | 1158 / 46 | 0 / 0 |
| TACR | Archaeological analogues for verification of lifetime models of canister for radioactive waste deep geological repository | 2249 / 89 | 2199 / 87 | 1909 / 75 | 904 / 36 | 0 / 0 |
| TACR | H2PLAZMON - Advanced plasmonic technology for production, storage, and utilization of green hydrogen | 7451 / 294 | 7451 / 294 | 7451 / 294 | 7451 / 294 | 7430 / 293 |
| TACR | Influence of radiolysis and bacterial extremophiles on lifetime of the canister for deep geological repository | 0 / 0 | 983 / 39 | 2630 / 104 | 2709 / 107 | 1664 / 66 |
| TACR | Research and development of an innovative corrosion resistant coating for bipolar plates for energy conversion devices | 0 / 0 | 0 / 0 | 9821 / 387 | 10253 / 404 | 10203 / 402 |
| TACR | Development of a cost-effective anode for PEM water electrolysis | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 960 / 38 |
| TACR | Advanced superconducting ceramics for energy applications | 331 / 13 | 331 / 13 | 331 / 13 | 331 / 13 | 331 / 13 |

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|------------------------------------|---|----------------------------|----------------------|----------------------|----------------------|----------------------|
| TACR | Advanced reversible system for hydrogen production on base of the high temperature solid oxide cell | 0 / 0 | 0 / 0 | 0 / 0 | 4381 / 173 | 4311 / 170 |
| TACR | | 16219 / 640 | 19078 / 753 | 32480 / 1281 | 34469 / 1360 | 27840 / 1098 |
| TOTAL | | 116840 / 4609 | 130469 / 5147 | 230027 / 9074 | 182197 / 7187 | 181971 / 7178 |
| In the role of another participant | | | | | | |
| Provider ²⁵ | | Support (in thousands CZK) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Sustainable zero-waste lithium production | 0 / 0 | 0 / 0 | 0 / 0 | 2901 / 114 | 0 / 0 |
| European comission | IMPROVING STEEL PRODUCT DURABILITY THROUGH ALLOY COATING MICROSTRUCTURE | 259 / 10 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | Development of new electrode materials and understanding of degradation mechanisms on Solid Oxide High Temperature Electrolysis Cells. | 1964 / 77 | 2576 / 102 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | Next-generation membrane technologies for sustainable exploitation of seawater brine resources: transition towards a circular blue industry | 0 / 0 | 0 / 0 | 0 / 0 | 49 / 2 | 7 / 0 |
| European comission | Reli-ion: Innovation transfer & B2B collaboration on Li-ion battery recycling | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 586 / 23 |
| European comission | Developing New 2D Materials and Heterostructures for Printed Digital Devices | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 10 / 0 |
| European comission | Developing optoelectronics in two-dimensional semiconductors | 0 / 0 | 0 / 0 | 813 / 32 | 1759 / 69 | 1549 / 61 |
| European comission | | 2224 / 88 | 2576 / 102 | 813 / 32 | 4708 / 186 | 2152 / 85 |
| GACR | Separation of Racemic Mixtures by Membrane Processes | 712 / 28 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Complex Artificial Electromagnetic Structures and Nanostructures | 532 / 21 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Polyacetylene type microporous polymers for applications in heterogeneous catalysis. | 1211 / 48 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Novel electrochemically active thiacalix[4]arenes and their oxidized analogues as ligands and receptors | 991 / 39 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Optical active centers and microstructuring in ZnO and cubic ZrO ₂ | 927 / 37 | 927 / 37 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Biodegradable zinc based alloys with optimized corrosion, mechanical and biological properties | 1420 / 56 | 1420 / 56 | 36 / 1 | 0 / 0 | 0 / 0 |
| GACR | Functional organic-inorganic self-assembling nanostructures | 1268 / 50 | 1218 / 48 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Ion beam writing synthesis of novel microstructures in advanced polymers and nanocomposites | 1787 / 70 | 1787 / 70 | 1787 / 70 | 0 / 0 | 0 / 0 |

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|------|---|-----------|-----------|------------|------------|------------|
| GACR | Smart supramolecular photochromic nanostructures | 1427 / 56 | 1477 / 58 | 1427 / 56 | 0 / 0 | 0 / 0 |
| GACR | Glass in Czech lands from Gothic to Baroque according findings from Chrudim and Brno. The importance of regional production in the European context | 812 / 32 | 812 / 32 | 812 / 32 | 82 / 3 | 0 / 0 |
| GACR | Concrete slurry - hazardous waste or secondary raw material? | 700 / 28 | 700 / 28 | 712 / 28 | 0 / 0 | 0 / 0 |
| GACR | Non-metal doped nanostructures of graphitic carbon nitride for photocatalytic reactions | 830 / 33 | 1188 / 47 | 1188 / 47 | 0 / 0 | 0 / 0 |
| GACR | New approaches preventing passivation in monitoring of environmental organic pollutants | 0 / 0 | 1016 / 40 | 1016 / 40 | 1016 / 40 | 0 / 0 |
| GACR | New Generation of Organic/Inorganic Materials for Carbon Dioxide Detection, Capture and Utilization | 0 / 0 | 1430 / 56 | 1430 / 56 | 1430 / 56 | 0 / 0 |
| GACR | Degradable nanocellulose as a novel temporary scaffold for tissue engineering | 0 / 0 | 1530 / 60 | 1530 / 60 | 1530 / 60 | 0 / 0 |
| GACR | Organic gas sensors – novel structures, electrical parameters, properties and operation | 0 / 0 | 1130 / 45 | 1507 / 59 | 1507 / 59 | 0 / 0 |
| GACR | Separation of Enantiomers by Chiral Membranes: Experiment and Simulations | 0 / 0 | 792 / 31 | 792 / 31 | 792 / 31 | 0 / 0 |
| GACR | New nanomaterials for anion separation | 0 / 0 | 1317 / 52 | 1317 / 52 | 1317 / 52 | 0 / 0 |
| GACR | Preparation and characterization of hybrid plasmonic nanostructures with strong chiral response | 0 / 0 | 1573 / 62 | 1573 / 62 | 1573 / 62 | 0 / 0 |
| GACR | Porous polymer networks with helically chiral polyacetylene chains for enantioselective applications | 0 / 0 | 0 / 0 | 1253 / 49 | 1313 / 52 | 1289 / 51 |
| GACR | Innovative plasma-chemical and chemical synthesis of nickel-containing mixed oxide catalysts for the oxidation of volatile organic pollutants | 0 / 0 | 0 / 0 | 988 / 39 | 988 / 39 | 988 / 39 |
| GACR | New functionalized plasmon-based sensors as tools for cell monitoring and advanced tissue engineering | 0 / 0 | 0 / 0 | 1807 / 71 | 1807 / 71 | 1807 / 71 |
| GACR | Synthesis of large area TiO ₂ nanotube layers for effective photocatalytic degradation of pollutants in gas phase and viruses | 0 / 0 | 0 / 0 | 1123 / 44 | 1203 / 47 | 1225 / 48 |
| GACR | Nanocrystallography of molecular crystals | 0 / 0 | 0 / 0 | 3606 / 142 | 3606 / 142 | 3606 / 142 |
| GACR | Microstructural investigation and simulation of coupled physical fields in concrete due to electromigration treatments | 0 / 0 | 0 / 0 | 991 / 39 | 1376 / 54 | 1366 / 54 |
| GACR | Low-phonon energy transparent ceramic luminophores emitting in the short- and mid-infrared region | 0 / 0 | 0 / 0 | 0 / 0 | 922 / 36 | 1410 / 56 |

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|---------------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|
| GACR | Chirality as a tool for controlling photoresponsiveness of supramolecular arrangements | 0 / 0 | 0 / 0 | 0 / 0 | 1622 / 64 | 1646 / 65 |
| GACR | Preparation and properties of nanoporous membranes with functionalized nanoparticles | 0 / 0 | 0 / 0 | 0 / 0 | 1026 / 40 | 1368 / 54 |
| GACR | Research of heavy metals immobilization in alternative low-carbon composites | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1300 / 51 |
| GACR | Prediction of mechanical behaviour of structures 3D printed based on alloy of titanium with betastructure | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 900 / 36 |
| GACR | Pushing the limits of complexity in solving crystal structures of polycrystalline materials using a combination of XRPD and ssNMR | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 672 / 27 |
| GACR | Advanced inorganic nanocomposites for distributed sensors of harmful radiation | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1154 / 46 |
| GACR | Influence of surface modifications on the functionality of zinc-based absorbable materials for applications in bone reconstructions | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1681 / 66 |
| GACR | Smart and programmable housing and living – energy storage systems are hidden everywhere in our buildings within basic construction components | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1566 / 62 |
| GACR | Graphene oxide electronic structure modulation by intentional doping and defect introduction by ion beams for microelectronics, catalysts and sensors | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1458 / 58 |
| GACR | | 12617 / 498 | 18317 / 723 | 24895 / 982 | 23110 / 912 | 23436 / 924 |
| Ministry of culture | Czech Art in the 1950s-1980s in the Public Space: Recording, Research, and Restoration. | 1809 / 71 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of culture | Conservation of Glass and Stone Mosaics of the Czech Mosaics School | 1231 / 49 | 961 / 38 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of culture | Development of conservation methods for seals and textile materials used for their attachment | 1657 / 65 | 1538 / 61 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of culture | Synthetic materials in the library collections | 727 / 29 | 727 / 29 | 727 / 29 | 727 / 29 | 0 / 0 |
| Ministry of culture | Advanced archaeometric methods for quality data obtaining for large complexes of artefacts | 0 / 0 | 1244 / 49 | 1488 / 59 | 1488 / 59 | 0 / 0 |
| Ministry of culture | Artifact as a source of knowledge: Rescue and preservation of research data of archaeological finds | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 763 / 30 |
| Ministry of culture | Memory fibers. The past and the present of Vamberk lace-making | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1411 / 56 |
| Ministry of culture | Methods for consolidation of brittle porous beeswax seals | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 514 / 20 |
| Ministry of culture | Post-war art in architecture – registration and modern materials | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2406 / 95 |

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|--|---|-------------------|-------------------|-------------------|-------------------|-------------------|
| Ministry of culture | | 5424 / 214 | 4470 / 176 | 2215 / 87 | 2215 / 87 | 5094 / 201 |
| Ministry of Education, Youth and Sports | National Infrastructure for Chemical Biology | 2267 / 89 | 4841 / 191 | 4737 / 187 | 4714 / 186 | 4922 / 194 |
| Ministry of Education, Youth and Sports | Enabling the participation of research organizations in the European Energy Research Alliance (EERA) | 236 / 9 | 471 / 19 | 471 / 19 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Excellence in Regenerative Medicine | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 521 / 21 |
| Ministry of Education, Youth and Sports | Materials and technologies for sustainable development | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 935 / 37 |
| Ministry of Education, Youth and Sports | Mechanical engineering of biological and bio-inspired systems | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2955 / 117 |
| Ministry of Education, Youth and Sports | | 2503 / 99 | 5312 / 210 | 5208 / 205 | 4714 / 186 | 9333 / 368 |
| Ministry of Health | Implantable sensors for early detection of infection and bacterial colonization | 0 / 0 | 432 / 17 | 678 / 27 | 678 / 27 | 641 / 25 |
| Ministry of Health | Novel vascularized stem-cell based constructs for soft and hard tissue engineering | 0 / 0 | 502 / 20 | 772 / 30 | 772 / 30 | 772 / 30 |
| Ministry of Health | Hydrolytic cleavage products of protein adducts in urine as a new type of biomarkers in preventive medicine | 464 / 18 | 642 / 25 | 642 / 25 | 642 / 25 | 0 / 0 |
| Ministry of Health | Pheochromocytoma as a model of chronic activation of the stress axis in the pathogenesis of metabolic disorders | 1029 / 41 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Health | | 1493 / 59 | 1576 / 62 | 2092 / 83 | 2092 / 83 | 1413 / 56 |
| Ministry of Industry and Trade | Photocatalytic boards from ceramic foam | 704 / 28 | 231 / 9 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Advanced superconductors for levitation disks | 420 / 17 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Advanced process for electrolytic hydrogen production from renewable sources | 1511 / 60 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | The new generation of chemo indicators for monitoring the effectiveness of VHP cycle | 1021 / 40 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Structural biodegradable implants processing by means of direct metal laser sintering | 750 / 30 | 800 / 32 | 450 / 18 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Possibilities of utilization of coal-ash from power stations stored at stock piles | 1048 / 41 | 1048 / 41 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Technology of the production of ethylene from renewable resources | 650 / 26 | 430 / 17 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Functional additives for engineered stone with new enhanced properties | 679 / 27 | 622 / 25 | 560 / 22 | 104 / 4 | 0 / 0 |
| Ministry of Industry and Trade | Research and development of primary materials for the deposition of superconducting thin films | 555 / 22 | 1470 / 58 | 1470 / 58 | 1470 / 58 | 0 / 0 |
| Ministry of Industry and Trade | WET OXIDATION | 563 / 22 | 1474 / 58 | 1474 / 58 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | | 7902 / 312 | 6075 / 240 | 3953 / 156 | 1574 / 62 | 0 / 0 |

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|---------------------------------|---|-------------------|-----------------|-----------------|-----------------|-------------------|
| Ministry of the Interior | Development and realization of autonomous DC power supply with hydrogen fuel cell | 1397 / 55 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Advanced element for archival documents identification | 759 / 30 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Safety improvement of extension ladders for firefighters | 413 / 16 | 413 / 16 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Smart system for wearable protective equipment enabling telemonitoring and planning of police and military interventions | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1845 / 73 |
| Ministry of the Interior | Upgrade of salt detector | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1381 / 54 |
| Ministry of the Interior | | 2569 / 101 | 413 / 16 | 0 / 0 | 0 / 0 | 3226 / 127 |
| Other foreign | Intensification and streamlining of the link between the White Carpathian Glass Base and SMEs | 0 / 0 | 0 / 0 | 934 / 37 | 862 / 34 | 71 / 3 |
| Other foreign | Natural zeolites in V4 countries – analysis of sales market and applications | 0 / 0 | 0 / 0 | 0 / 0 | 103 / 4 | 0 / 0 |
| Other foreign | | 0 / 0 | 0 / 0 | 934 / 37 | 965 / 38 | 71 / 3 |
| TACR | Membrane intelligent systems 4.0 | 0 / 0 | 1343 / 53 | 915 / 36 | 915 / 36 | 0 / 0 |
| TACR | Advanced and inovative processing technologies for strategic utilization and storing of coal combustion products (CCPs) | 0 / 0 | 2197 / 87 | 2197 / 87 | 2197 / 87 | 2214 / 87 |
| TACR | Enhancement of 3D printing filament properties using nanofiber additives | 0 / 0 | 975 / 38 | 975 / 38 | 1214 / 48 | 0 / 0 |
| TACR | Development of a heavy-duty vehicle with a hydrogen fuel cell | 0 / 0 | 0 / 0 | 1240 / 49 | 1296 / 51 | 1342 / 53 |
| TACR | Development and validation of a modular solution for WWTP outlets treatment and reuse | 0 / 0 | 0 / 0 | 1351 / 53 | 1351 / 53 | 1351 / 53 |
| TACR | Solution to protection of nitinol stents against corrosion environment of human body and new approaches to their testing | 0 / 0 | 0 / 0 | 977 / 39 | 977 / 39 | 977 / 39 |
| TACR | Additive manufacture of high value joint replacement – reliability, performance, individuality | 420 / 17 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Development of horizontal and vertical levitating conveyor systems | 380 / 15 | 380 / 15 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Surgical treatment of injured joints | 900 / 36 | 900 / 36 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Hydrogen Refueling Station (HRS) for Small Fuel Cell Vehicles (FCV) | 1350 / 53 | 1676 / 66 | 492 / 19 | 0 / 0 | 0 / 0 |
| TACR | Gradient functionally structured hip implant with a long life span | 900 / 36 | 900 / 36 | 900 / 36 | 0 / 0 | 0 / 0 |
| TACR | Carbon (nano)structures and their modifications for composites | 630 / 25 | 630 / 25 | 630 / 25 | 0 / 0 | 0 / 0 |
| TACR | The preparation of a TiNbTa powder alloy designated for manufacturing of joint implants with trabecular osseointegration surface by the 3D printing | 560 / 22 | 624 / 25 | 680 / 27 | 720 / 28 | 0 / 0 |

| | | | | | | |
|--------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| TACR | Research of raw material potential of strategic minerals in brines of the Bohemian Massif. | 0 / 0 | 0 / 0 | 66 / 3 | 716 / 28 | 1332 / 53 |
| TACR | The research contents of Be, Ge, Ga and In in tailing ponds of ash in CR | 0 / 0 | 246 / 10 | 931 / 37 | 0 / 0 | 0 / 0 |
| TACR | National Competence Centre of Mechatronics and Smart Technologies for Mechanical Engineering | 4400 / 174 | 4400 / 174 | 3344 / 132 | 1056 / 42 | 3833 / 151 |
| TACR | ALternative infill MAterials for disposal of NPP decommissioning RAdioactive waste (ALMARA) | 0 / 0 | 1218 / 48 | 1383 / 55 | 1443 / 57 | 1484 / 59 |
| TACR | Research and development of innovative compounds with complex effects and methods of their binding to new generation transporters for targeted transport of active substances in the GIT of poultry | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1482 / 58 |
| TACR | Reactors with high adaptability towards new electrochemical technologies | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 739 / 29 |
| TACR | Unit for caprolactam isolation without the use of toxic extraction reagents | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1613 / 64 |
| TACR | Inkjet manufacturing of CCMs for PEMFC by development of catalytic inks & their deposition | 0 / 0 | 0 / 0 | 0 / 0 | 1042 / 41 | 2291 / 90 |
| TACR | Research and development of a reversible alkaline fuel cell | 1615 / 64 | 2390 / 94 | 2418 / 95 | 2432 / 96 | 2432 / 96 |
| TACR | High temperature resistant materials for components in thermodynamic cycles | 0 / 0 | 0 / 0 | 0 / 0 | 616 / 24 | 603 / 24 |
| TACR | Research and development of independent power supplies for decentralised power sector | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1431 / 56 |
| TACR | Advanced multifunctional diagnostic system of water electrolyzers based on proton conductive and alkaline polymer electrolyte | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 894 / 35 |
| TACR | Development of a waste-free technology using a modified Solid recovery fuels (SRF) to reduce the environmental burden in the production of heat and electricity in conventional sources. | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 957 / 38 |
| TACR | National Competence Centre of Mechatronics and Smart Technologies for Mechanical Engineering | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3833 / 151 |
| TACR | NCC for industrial 3D printing | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1594 / 63 |
| TACR | Regional hydrogen trains on Czech railways | 0 / 0 | 0 / 0 | 874 / 34 | 874 / 34 | 899 / 35 |
| TACR | | 11155 / 440 | 17879 / 705 | 19373 / 764 | 16849 / 665 | 31302 / 1235 |
| TOTAL | | 45887 / 1810 | 56619 / 2233 | 59483 / 2346 | 56228 / 2218 | 76027 / 2999 |

Table 3.3.2 - Contract research activities

| Client ²⁵ | Activity name | Revenue (in thousands CZK/EUR) | | | | |
|---|------------------------------|--------------------------------|---------|----------|---------|----------|
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| USTAV APLIKOVANE MEC | Project of contract research | 1875/74 | 1810/71 | 4335/171 | 50/2 | 3335/132 |
| TAMINCO BV | Project of contract research | 1018/40 | 1074/42 | 1266/50 | 1237/49 | 1185/47 |
| BORSODCHEM MCHZ, S.R | Project of contract research | 650/26 | 500/20 | 762/30 | 750/30 | 500/20 |
| TEVA CZECH INDUSTRIE QC TAPI | Project of contract research | 775/31 | 670/26 | 420/17 | 450/18 | 0/0 |
| SPOLANA S.R.O. | Project of contract research | 543/21 | 450/18 | 500/20 | 600/24 | 0/0 |
| CEZ, A. S. | Project of contract research | 429/17 | 427/17 | 778/31 | 347/14 | 72/3 |
| INSTITUT CORROSION | Project of contract research | 0/0 | 370/15 | 408/16 | 636/25 | 637/25 |
| UNIPETROL RPA, S.R.O | Project of contract research | 466/18 | 100/4 | 665/26 | 424/17 | 350/14 |
| EUROSUPPORT MANUFACT | Project of contract research | 400/16 | 550/22 | 440/17 | 450/18 | 0/0 |
| GEOMET S.R.O. Mstišov | Project of contract research | 0/0 | 0/0 | 0/0 | 1642/65 | 0/0 |
| TEMPERATOR S.R.O. | Project of contract research | 300/12 | 370/15 | 325/13 | 0/0 | 600/24 |
| UJV REZ, A. S. Řež u Prahy | Project of contract research | 975/38 | 2/0 | 179/7 | 399/16 | 24/1 |
| AROMA PRAHA, A.S. | Project of contract research | 300/12 | 300/12 | 300/12 | 300/12 | 300/12 |
| DIAMORPH HOB CERTEC | Project of contract research | 325/13 | 106/4 | 261/10 | 329/13 | 209/8 |
| CERAMTEC CZECH REPU | Project of contract research | 285/11 | 200/8 | 130/5 | 252/10 | 208/8 |
| BG SYS HT S.R.O. | Project of contract research | 360/14 | 0/0 | 225/9 | 225/9 | 225/9 |
| PRECHEZA A.S. | Project of contract research | 400/16 | 0/0 | 200/8 | 300/12 | 0/0 |
| SYNTHOMER A.S. Odd. dodavatelských faktur | Project of contract research | 400/16 | 300/12 | 0/0 | 0/0 | 200/8 |
| SYNTHOMER (UK) LIMIT | Project of contract research | 0/0 | 0/0 | 0/0 | 513/20 | 372/15 |
| CHIRAL TECHNOLOGIES Parc d'Innovation | Project of contract research | 0/0 | 0/0 | 0/0 | 854/34 | 0/0 |
| UNIPETROL VYZKUMNE V | Project of contract research | 5/0 | 49/2 | 513/20 | 260/10 | 0/0 |

²⁵ If the client is from abroad, indicate in brackets the country of origin of the client.

| | | | | | | |
|---|------------------------------|--------|--------|--------|-------|--------|
| MURATA INTEGRATED PA | Project of contract research | 0/0 | 541/21 | 254/10 | 0/0 | 0/0 |
| AGC AUTOMOTIVE CZECH | Project of contract research | 143/6 | 237/9 | 49/2 | 180/7 | 175/7 |
| HUNTSMAN (SINGAPORE) | Project of contract research | 0/0 | 733/29 | 0/0 | 0/0 | 0/0 |
| UNIVERZ. J.E.PURKYNE | Project of contract research | 66/3 | 294/12 | 170/7 | 187/7 | 6/0 |
| HUNTSMAN ADVANCED MA | Project of contract research | 0/0 | 701/28 | 0/0 | 0/0 | 0/0 |
| ZENTIVA, K.S. | Project of contract research | 200/8 | 70/3 | 0/0 | 10/0 | 393/15 |
| SEV.EN INNTECH A.S. | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 658/26 |
| AUSTIN DETONATOR S.R | Project of contract research | 46/2 | 176/7 | 122/5 | 164/6 | 141/6 |
| RANIDO, S.R.O. | Project of contract research | 197/8 | 110/4 | 51/2 | 80/3 | 192/8 |
| VUAB PHARMA A.S. | Project of contract research | 204/8 | 59/2 | 52/2 | 130/5 | 120/5 |
| HOLCIM (CESKO), A.S. | Project of contract research | 0/0 | 299/12 | 0/0 | 0/0 | 260/10 |
| UOCHB AV CR | Project of contract research | 87/3 | 136/5 | 83/3 | 107/4 | 124/5 |
| ESTCOM - OXIDOVA KER | Project of contract research | 128/5 | 126/5 | 125/5 | 95/4 | 55/2 |
| ADDICOO GROUP S.R.O. | Project of contract research | 0/0 | 50/2 | 260/10 | 130/5 | 60/2 |
| ASECO, S.R.O. | Project of contract research | 109/4 | 94/4 | 126/5 | 110/4 | 45/2 |
| MERO CR, A.S. | Project of contract research | 117/5 | 117/5 | 0/0 | 117/5 | 117/5 |
| UNIVERZITA HRADEC KR | Project of contract research | 0/0 | 75/3 | 53/2 | 194/8 | 140/6 |
| EUROSUPPORT MANUFACT Euro Support Manufacturing Czechia, s.r.o. | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 450/18 |
| SYNTHOMER A.S. | Project of contract research | 0/0 | 400/16 | 0/0 | 0/0 | 50/2 |
| TEVA CZECH INDUSTRIE | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 450/18 |
| TECHNICKA UNIVERZIT | Project of contract research | 0/0 | 52/2 | 1/0 | 49/2 | 342/13 |
| SANECA PHARMACEUTICA | Project of contract research | 140/6 | 74/3 | 0/0 | 128/5 | 93/4 |
| CVUT Fakulta stavební | Project of contract research | 51/2 | 241/9 | 23/1 | 97/4 | 8/0 |
| NARODNI MUZEUM | Project of contract research | 329/13 | 12/0 | 40/2 | 0/0 | 0/0 |

| | | | | | | |
|----------------------|------------------------------|--------|--------|------|--------|--------|
| SKODA AUTO A.S. | Project of contract research | 30/1 | 138/5 | 13/1 | 138/5 | 60/2 |
| HOLCIM INNOVATION CE | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 350/14 |
| AGC FLAT GLASS CZECH | Project of contract research | 173/7 | 68/3 | 18/1 | 17/1 | 62/2 |
| EKAZ PRAHA A. S. | Project of contract research | 184/7 | 151/6 | 0/0 | 0/0 | 0/0 |
| SPRAVA ULOZIST RADIO | Project of contract research | 15/1 | 0/0 | 0/0 | 0/0 | 320/13 |
| EVONIK OPERATIONS GM | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 321/13 |
| LUCEBNI ZAVODY DRASL | Project of contract research | 33/1 | 224/9 | 30/1 | 15/1 | 15/1 |
| WISETECHENGINEERING | Project of contract research | 0/0 | 315/12 | 0/0 | 0/0 | 0/0 |
| ART CARBON S.R.O. | Project of contract research | 304/12 | 0/0 | 0/0 | 0/0 | 0/0 |
| NANOCOMPLEX S.R.O. | Project of contract research | 0/0 | 0/0 | 0/0 | 300/12 | 0/0 |
| GATEMA PCB A.S. | Project of contract research | 0/0 | 300/12 | 0/0 | 0/0 | 0/0 |
| GUMOKOV, A.S. | Project of contract research | 116/5 | 71/3 | 87/3 | 8/0 | 8/0 |
| VUEZ, A.S. | Project of contract research | 103/4 | 107/4 | 20/1 | 20/1 | 38/2 |
| LINDNER CONSULTING G | Project of contract research | 284/11 | 0/0 | 0/0 | 0/0 | 0/0 |
| PRECIOSA ORNELA, A.S | Project of contract research | 39/2 | 30/1 | 0/0 | 134/5 | 71/3 |
| CROWN METALS CZ S.R. | Project of contract research | 0/0 | 56/2 | 0/0 | 200/8 | 0/0 |
| LIBERTY OSTRAVA A.S. | Project of contract research | 0/0 | 76/3 | 76/3 | 0/0 | 100/4 |
| GLYCONA S.R.O. | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 250/10 |
| INDORAMA VENTURES MO | Project of contract research | 80/3 | 160/6 | 0/0 | 0/0 | 0/0 |
| SU JADERNE OCHRANY | Project of contract research | 60/2 | 0/0 | 0/0 | 0/0 | 180/7 |
| CENTRUM VYZKUMU REZ | Project of contract research | 0/0 | 58/2 | 11/0 | 27/1 | 144/6 |
| ROBERT BOSCH GMBH | Project of contract research | 0/0 | 0/0 | 0/0 | 237/9 | 0/0 |
| TEDIKO, S.R.O. | Project of contract research | 102/4 | 129/5 | 0/0 | 0/0 | 0/0 |
| SKODA AUTO A.S. | Project of contract research | 230/9 | 0/0 | 0/0 | 0/0 | 0/0 |

| | | | | | | |
|----------------------|------------------------------|-------|-------|-------|-------|-------|
| WAVIN EKOPLASTIK S.R | Project of contract research | 0/0 | 12/0 | 118/5 | 17/1 | 80/3 |
| GZ MEDIA, A.S. | Project of contract research | 72/3 | 26/1 | 40/2 | 34/1 | 54/2 |
| CHROMSERVIS S.R.O. | Project of contract research | 0/0 | 0/0 | 112/4 | 90/4 | 17/1 |
| ROBERT BOSCH MANUFAC | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 205/8 |
| EAST-WEST-BRIDGE, SP | Project of contract research | 200/8 | 0/0 | 0/0 | 0/0 | 0/0 |
| ARCHEOLOGICKY U. AV | Project of contract research | 20/1 | 155/6 | 0/0 | 2/0 | 20/1 |
| CHEMOPROJEKT, A.S. | Project of contract research | 0/0 | 0/0 | 80/3 | 95/4 | 20/1 |
| MEMBRAIN S.R.O. | Project of contract research | 0/0 | 0/0 | 158/6 | 8/0 | 29/1 |
| SCHOTT AG | Project of contract research | 0/0 | 188/7 | 0/0 | 0/0 | 0/0 |
| LASAK S.R.O. | Project of contract research | 10/0 | 23/1 | 73/3 | 35/1 | 47/2 |
| COMTES FHT A.S. | Project of contract research | 0/0 | 7/0 | 30/1 | 150/6 | 0/0 |
| CEPS A.S. | Project of contract research | 0/0 | 0/0 | 180/7 | 0/0 | 0/0 |
| SLOVNAFT, A.S. | Project of contract research | 80/3 | 0/0 | 56/2 | 44/2 | 0/0 |
| IMPACT INNOVATIONS G | Project of contract research | 14/1 | 39/2 | 58/2 | 12/0 | 56/2 |
| HELLA AUTOTECHNIK NO | Project of contract research | 155/6 | 0/0 | 15/1 | 0/0 | 0/0 |
| BEZNOSKA, S.R.O. | Project of contract research | 98/4 | 6/0 | 26/1 | 39/2 | 0/0 |
| PRAKAB PRAZSKA KABEL | Project of contract research | 0/0 | 8/0 | 98/4 | 45/2 | 14/1 |
| SSI SCHAFFER S.R.O. | Project of contract research | 0/0 | 0/0 | 0/0 | 164/6 | 0/0 |
| ING. STANISLAV SKAKA | Project of contract research | 41/2 | 0/0 | 53/2 | 43/2 | 22/1 |
| CRYSTALEX CZ, S.R.O. | Project of contract research | 90/4 | 0/0 | 0/0 | 0/0 | 67/3 |
| CVUT Kloknerův ústav | Project of contract research | 27/1 | 35/1 | 50/2 | 14/1 | 29/1 |
| NARODNI PAMATKOVY US | Project of contract research | 0/0 | 0/0 | 3/0 | 72/3 | 78/3 |
| KOSTAL ENGINEERING C | Project of contract research | 0/0 | 0/0 | 39/2 | 22/1 | 91/4 |
| NEW OIL GENERATION S | Project of contract research | 0/0 | 0/0 | 150/6 | 0/0 | 0/0 |

| | | | | | | |
|--|------------------------------|-------|------|-------|-------|-------|
| PJSK "PIGMENT" | Project of contract research | 0/0 | 0/0 | 149/6 | 0/0 | 0/0 |
| KOSTAL CR, SPOL. | Project of contract research | 144/6 | 4/0 | 0/0 | 0/0 | 0/0 |
| CASALE PROJECT A.S. | Project of contract research | 20/1 | 20/1 | 107/4 | 0/0 | 0/0 |
| SKODA JS A.S. SK SE-EMO34 | Project of contract research | 93/4 | 54/2 | 0/0 | 0/0 | 0/0 |
| ADVANCED MATERIALS - | Project of contract research | 144/6 | 0/0 | 0/0 | 0/0 | 0/0 |
| ARMED MEDICAL S.R.O. | Project of contract research | 0/0 | 0/0 | 70/3 | 70/3 | 0/0 |
| ROBERT BOSCH, SPOL. RBCB/FIN1 | Project of contract research | 0/0 | 73/3 | 14/1 | 0/0 | 49/2 |
| SAINT-GOBAIN SEKURIT | Project of contract research | 100/4 | 35/1 | 0/0 | 0/0 | 0/0 |
| INSTITUT CORROSION Erwan Diler | Project of contract research | 131/5 | 0/0 | 0/0 | 0/0 | 0/0 |
| DIAMO, STATNI PODNIK | Project of contract research | 33/1 | 95/4 | 0/0 | 0/0 | 0/0 |
| FARMAK, A.S. | Project of contract research | 126/5 | 0/0 | 0/0 | 0/0 | 0/0 |
| ZAPADOCESKA UNIVERZI | Project of contract research | 124/5 | 0/0 | 0/0 | 0/0 | 0/0 |
| PENTO, SPOL. S R.O. | Project of contract research | 0/0 | 0/0 | 0/0 | 120/5 | 0/0 |
| SYNPO, AKCIOVA SPOLE | Project of contract research | 120/5 | 0/0 | 0/0 | 0/0 | 0/0 |
| LOVOCHEMIE, A.S. | Project of contract research | 0/0 | 25/1 | 0/0 | 0/0 | 92/4 |
| PRO.MED.CS PRAHA A.S | Project of contract research | 0/0 | 0/0 | 0/0 | 99/4 | 18/1 |
| UNIVERZITA KARLOVA Katolická teologická fakulta Univerzity Karlovy | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 117/5 |
| ING. BOHUMIL CERNIK | Project of contract research | 0/0 | 0/0 | 14/1 | 98/4 | 0/0 |
| ELECTRIC GLASS FIBER Nippon Electric Glass (NEG-US) | Project of contract research | 111/4 | 0/0 | 0/0 | 0/0 | 0/0 |
| GLASS SERVICE, A.S. | Project of contract research | 4/0 | 1/0 | 6/0 | 0/0 | 99/4 |
| FLEXFILL S.R.O. | Project of contract research | 0/0 | 35/1 | 0/0 | 48/2 | 28/1 |
| MESSER TECHNOGAS S.R | Project of contract research | 0/0 | 0/0 | 41/2 | 0/0 | 65/3 |
| OKM GROUP BRNO, SPOL | Project of contract research | 0/0 | 0/0 | 0/0 | 0/0 | 105/4 |
| BOCHEMIE A.S. | Project of contract research | 100/4 | 0/0 | 0/0 | 0/0 | 0/0 |

| | | | | | | |
|--|------------------------------|------------------|------------------|------------------|------------------|------------------|
| KAVALIERGLASS, A. S. | Project of contract research | 0/0 | 100/4 | 0/0 | 0/0 | 0/0 |
| Sum of others (< 100 000 Kč / 3917 euro) | Different types of analyses | 1916/75 | 1590/62 | 1732/68 | 1794/70 | 1593/62 |
| TOTAL | | 17049/669 | 16289/637 | 16843/661 | 16007/628 | 17010/667 |

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁶, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

Selected 10 most important research results with existing or prospective impact on society is listed and described in detail:

1) F - UTILITY MODEL, INDUSTRIAL MODEL: Zinc biodegradable alloy

Biodegradable metal materials based on zinc are considered promising for the production of medical devices, such as fixation elements in the case of fractures (nails, screws) and stents used to open blood vessels. The utility model describes a new material with an excellent ratio of utility properties (high strength and ductility, biocompatibility, adequate degradation rate). Its mechanical properties place the material among the top low-alloy zinc alloys (strength up to 380 MPa, ductility up to 35%). In contrast to commercially produced implants made of magnesium alloys, there is no risk of hydrogen release, and therefore no undesirable formation of bubbles around the implant, complicating the formation of new tissue or bringing the risk of blood vessel blockage (embolism). The application of the developed biodegradable material in medicine thus brings a significant breakthrough in the field of medicine. The use of a biodegradable zinc alloy will also significantly reduce the burden on patients, as there will be no need for surgical removal of the screw after the bone has healed due to its absorption. Health care costs will also be reduced by the costs of surgical removal of the implant, which are in the order of tens of thousands of CZK. The work and preparation of the utility model originated largely at the University of Chemical Technology in Prague, where alloys of variable composition were experimentally prepared using various techniques and their properties were tested. The composition was subsequently optimized. The Pro-Spon company participated in the development, mainly by describing and designing the required properties of the material with regard to the requirements of medical practice. After clinical tests and granting the CE mark, the ProSpon company will manufacture traumatological implants from this material, which will be sold to contractual medical facilities.

2) B-BOOK: Sculptures and Towns – Moravia. Art in Public Space 1945–1989

In the Czech milieu, the theme of post-war art in the public space is still lacking systematic and scientific assessment. The need for verified data that would provide precise information about the circumstances of the origin of the works led in 2015 to the formation of the science-research plan Czech Art of the 1950s – 1980s in the Public Area: Documentation, Surveys, Restoration. In the

²⁶ See Terms definition.

following year started a research project that included intensive area research across the whole territory of the Czech Republic as one of its parts. The outcomes of archival research and a field survey formed the basis of the online database Sochy a města. Today, this specific art topography summarizes information about existing and partially also vanished implementations. Entries from it have also been selected for the catalogue part of the publication. The selection was focused on artworks installed during the socialist period in localities of the eastern part of the Czech Republic – the historical land of Moravia. The research methods included above all the monitoring and documentation of works in the field and also archival research. The initial chapters of the book are based on the study of the sources; they are focused on the Moravian milieu but necessarily overlap also to the neighbouring regions of socialist Czechoslovakia. In the beginning, we offer an overview of the current state of research showing that the domestic investigation of this theme is only in the beginnings. Further, we discuss the state control of art production and outline a broader context of the orders of monumental works. The commissioning and the functioning of the art committees that organized and corrected art production for the public space are described in detail. The individual chapters divided according to present-day administrative units sum up the situation in the regions. In the end, we open a view of the issues of present-day (non-)care for the extensive and qualitatively diverse fund.

3) Z- PILOT PLANT, PROVEN TECHNOLOGY: Production technology of dicyclopentadiene from light pyrolysis naphtha

A new production unit for dicyclopentadiene has been built and commissioned by ORLEN Unipetrol in Litvinov plant (CZ). This liquid hydrocarbon, abbreviated as DCPD, has a broad range of applications in the automotive industry, construction, electrical engineering, medicine, and pharmaceutical sectors. ORLEN Unipetrol will produce up to 26,000 tonnes of DCPD per year, making it one of the four largest producers in Europe. DCPD will be made using a technology developed by ORLEN Unipetrol researchers in collaboration with the University of Chemistry and Technology in Prague, the team led by Professor Josef Pašek. The investment in the construction of the new production unit totalled CZK 831 million. Twenty new jobs were created to ensure this new production.

4) Z- PILOT PLANT, PROVEN TECHNOLOGY: HVO co-pyrolysis with atmospheric gas oil

The technology will enable the co-processing of materials of biological origin - HVO, even from biomass other than primary (e.g. used cooking oil) and ethylene pyrolysis to convert it into petrochemical commodities with high added value. The technology will enable the transfer of this stream to the production of materials instead of energy use (as part of fuels). This appears to be more profitable and, moreover, more beneficial from the point of view of environmental protection (carbon incorporated in the material instead of CO₂ in flue gases).

It has been verified that the use of HVO will not endanger operational capability, nor will it reduce production efficiency and does not require modifications to the existing technology, except for the construction of supply pipeline connections and their control, and the processing conditions for this raw material have been optimized.

According to the results of simulations and experimental tests, the co-processing of HVO with a traditional raw material will increase the yields of desired pyrolysis products (ethylene, propylene) and reduce the yields of unwanted ones (oils) compared to the original traditional raw material. These differences will become even more pronounced with an increasing proportion of HVO in the raw material. Furthermore, it can be assumed from simulations and experiments that adding HVO to the

traditional feedstock increases its reactivity and to achieve similar pyrolysis sharpness, a slightly lower pyrolysis temperature should be sufficient (compared to pure traditional feedstock), which has the potential for energy savings when implemented on a large scale.

The authors from the Institute of Chemical Technology were the sole authors of the experimental implementation of the initial laboratory studies and the development of a computer model for transferring the results to the operational scale; of course, a number of other authors participated in the actual verification within the operational unit according to the verification protocol.

5) **Z- PILOT PLANT, PROVEN TECHNOLOGY: Semi-production of corrosion sensors**

The presented result is the pilot production of corrosion sensors, which was introduced in TTS, s.r.o. in 2022 based on the development of corrosion sensor production technology implemented at the Institute of Chemical Technology Prague. The authors of the result defined the parameters of the final products that had to be met to fulfill the expected function of the sensors, namely the detection of extremely low corrosion losses of metals at the atomic level. The fulfillment of these parameters was verified by a series of physical and corrosion tests. The result of the technology development is the production of a new very sensitive corrosion sensor, which is unique in its design, which allows three corrosion loss values to be recorded at a given moment using a single reference part. This allows for verification of measurement accuracy, increased data reliability, elimination of erroneous results, the possibility of detecting anomalous behavior, e.g. localized forms of corrosion, etc. The design solution allows the number of measuring parts to be expanded to more than three if a higher number of corrosion loss values are required or if different materials whose corrosion rate is to be measured are combined. The variability of production covers the wide need for measuring corrosion rates of the most common metals in technical practice and in the heritage sector (steel, zinc, copper, silver, aluminum, lead) with the necessary sensitivity. This introduces mass production at TTS and at the same time introduces the production of thin-film components for the first time at TTS. The uniqueness of the production of corrosion sensors also lies in the necessity of using classic thin-film technologies used for the production of microelectronic components for the production of macroscopic components with a size of several tens of mm. The required parameters are comparable to the requirements for microelectronic components. This brings with it a number of complications in terms of production technology and, above all, yield. During the development, a new line for the production of corrosion sensors was put into operation, including the development and implementation of custom-designed equipment and procedures (preparations, washing, masking and etching procedures, equipment for output inspection of corrosion sensors). The produced corrosion sensors have great potential for commercial use in the field of corrosion monitoring, for example, of sensitive electronic systems or transported goods, in the detection of substances harmful to health, in the protection of cultural heritage objects or in the research of corrosion processes.

6) **B – BOOK: Czech glass mosaic. History, technology, katalogue of exterior works**

The publication Czech Glass Mosaic is the first scientific monograph that systematically deals with domestic mosaic art. It follows the topic in an interdisciplinary manner, from the perspective of art history, technological and technical aspects, thus creating a comprehensive view of a previously neglected research problem. The book is divided into two sections. The first part consists of synthetic articles, the second is a catalogue of exterior mosaic works. The synthetic chapters of the introduction

to the book trace the history of individual mosaic workshops and artists from the Middle Ages to the end of the 20th century. They are followed by chapters with material studies dedicated to the technology and typology of mosaic glass and mortars. The second part of the book takes the form of catalogue entries of almost 400 exterior mosaics and includes works from the oldest medieval Last Judgment from St. Vitus Cathedral in Prague to the creations of contemporary artists.

The book is the result of many years of interdisciplinary research that was carried out as part of the activities of the University of Chemical Technology in Prague. The initiating moment was the research project Technology of Maintenance and Conservation of the Mosaic of the Last Judgment and Methods of Restoration-Conservation of Medieval and Archaeological Glass, which VSČHT addressed in 2012–2015 under the auspices of the Ministry of Culture. Research on the medieval mosaic from Prague Castle was supported by a comprehensive interdisciplinary survey of glass mosaic works across the entire Czech Republic. Research was conducted on the history of mosaics, but also on the chemical composition of glass and setting mortars, and changes in the technologies of mosaic material production. The follow-up project Restoration of Mosaics of the So-Called Czech Mosaic School from Glass and Stone, implemented between 2016–2020, subsequently brought numerous refinements, mainly thanks to detailed archival research in domestic and, above all, foreign archives. The projects subsequently provided an information base that was used in the preparation of the presented publication.

7) N - CERTIFIED METHODOLOGY, MEMORIAL OR TREATMENT PROCEDURE: Methodology of disinfection and cleaning of textile materials used for seals attachment

Textile pendants are an integral part of archival documents with an affixed seal, and keeping them in good condition is a condition for preserving both the seal and the legal value of the document. Therefore, the aim of this methodology was to recommend a suitable and safe procedure for the disinfection and cleaning of textile seal pendants. The conservation of textile pendants is specific because of their contact with other archival materials (seal, paper, parchment, etc.) and therefore it is not possible to use all the methods commonly used in the conservation-restoration process of textiles. The contribution of this methodology is to take into account the above mentioned specificities. Textile pendants of seals may be contaminated by dust impurities as well as impurities resulting from the production of seals or from previous restoration interventions, or they may be microbiologically attacked. Appropriate disinfection and sufficient cleaning of the textile pendants will contribute to its long-term stability. To choose the optimal disinfection method and cleaning procedure, a targeted survey is necessary, focusing primarily on the contamination with microorganisms, the condition of the textile pendants and its colour fastness. In the event of a positive result, disinfection with suitable agents is necessary. The choice of disinfectant is determined primarily by the type of micro-organisms present on the object and the number of objects to be treated. It is always preferable to use methods that allow individual treatment of individual archives, but in certain cases (e.g. natural disasters) it is necessary to use mass disinfection methods. Before cleaning a textile pendants, it is necessary to determine the degree of damage to the fabric and the type of soiling. The condition of the fabric is assessed both macroscopically and microscopically (e.g. using a USB microscope). The cohesion of the textile weave or the strength of the interlacing of the threads and whether there is any dusting. Based on the results of the survey, a suitable method of cleaning the fabric is then selected. The disinfectants and cleaning agents recommended in this methodology have been selected on the basis of extensive tests on model textile samples whose long-term stability has been evaluated after artificial ageing.

Based on the results obtained, the tested disinfectants can be divided into three groups. Gamma radiation (causing significant changes in the chemical structure of the fibres), silver nanoparticles (causing unacceptable changes in colour in the tested form), glutaraldehyde (causing changes in colour and chemical structure) and Chiroseptol (unacceptable changes in colour) were found to be unsuitable for the disinfection of historic textiles. Septonex may be used with reservations and only in justified cases (e.g. sensitivity of micro-organisms), but it causes some changes in the chemical structure of the fibres. Alcohol-based agents (Bacillol AF, butanol vapour) and Acticide MV are suitable agents which do not cause significant damage to the fabric. Ethylene oxide, which does not cause significant changes in the properties of both cellulose and protein fibres, can be used for treatment of large numbers of items. Similar to ethylene oxide, the tested fumigants do not cause significant changes in the structure of either protein or cellulose fibres and can be used for treatment of collections. When choosing a disinfectant, it is also necessary to take into account the condition of the textiles, the colour fastness of the dyes used, etc.

8) Z- PILOT PLANT, PROVEN TECHNOLOGY: New methanol column for VUAB Pharma Roztoky

VUAB Pharma is a major producer and exporter of nystatin, which is used in the treatment of yeast infections. Methanol is used as a solvent in its production. During the production process, an aqueous solution of methanol is discarded, which is contaminated with other substances. Regeneration of methanol from the waste solution to its original form is a key part of the technology, without which nystatin cannot be produced effectively. A new rectification line for the regeneration of waste methanol was designed at the Institute of Chemical Technology in Prague. The development of the concept of a new method for the regeneration of anhydrous methanol took about half a year and included a thorough analysis of the input stream of waste methanol, laboratory rectification with a real mixture, mathematical modeling of regeneration and the design of the new line itself. The problem that had to be solved was the fact that the injection of waste methanol contains a solid phase and during the distillation itself another solid phase is formed. This leads to clogging of the equipment. Therefore, it was necessary to design the line in such a way that critical parts could be easily cleaned. Cleaning can now be done in a matter of hours, while the old system took days. The new equipment designed replaced an almost 50-year-old column, which was difficult to clean due to its design and had recently experienced frequent breakdowns. The new equipment has a higher capacity and significantly lower heat consumption. The regeneration line successfully passed the test run in 2019 and is now operating at full capacity. The investment cost was about CZK 20 million. Thanks to the new line, it is possible to regenerate approximately 2,000 tons of methanol per year, which enabled an increase in the production of nystatin.

9) Other- KNOW HOW: High-performance liquid chromatography (HPLC) columns

The presented result comprise optimized chiral media (sorbents) used for the resolution of enantiomers of chiral compounds by high-performance liquid chromatography and/or supercritical fluid chromatography. The sorbents have been developed at the Department of organic chemistry, where the authors defined the optimum parameters of the materials and screened their use. The two enantiomeric anion-exchange type CSPs have a huge application potential in chiral separation of polar acidic compounds. Since a broad variety of current medicinal and pharmaceutical products falls within this category, CSPs capable of solving such problems in real life are of great interest not only in academia, but mainly in the industry. The technology is available in small scale (grams, laboratory use) up to the industrial scale (kilograms of sorbents). The evidence for the need of CSPs from the class of

ion exchangers can be found in the steadily increasing number of scientific publications on this topic as well as from the number of patents on various types of charged stationary phases available in public domain. Therefore, the scale-up of another two novel sorbents from this family is currently being developed at UCT Prague in frame of a Proof of Concept project and will be most probably commercialized in the near future.

10) Z- PILOT PLANT, PROVEN TECHNOLOGY: Sulfide liquor oxidation unit

The new technology addresses the treatment of wastewater sulfide leachates generated during the desulfurization of gasoline fractions at Unipetrol RPA in Litvínov. It comprises a hydrothermal process suitable for the oxidation of organic and inorganic substances contained in aqueous solutions. The process takes place at elevated temperature and pressure so that the reaction can take place in a liquid state. Specifically, this technology is based on the oxidation of sulfides in the liquid phase, under a pressure of 2.5 MPa and a temperature exceeding 150 °C, using pure oxygen, ultimately resulting in the formation of harmless sodium sulfate. The concentration of sulfides in the process decreases from an initial level of about 50,000 mg/l to below 0.1 mg/l. The reactor node assembly system is a protected intellectual property of UCT (UV 32 770), which was successfully licensed for this purpose. This approach effectively resolves a longstanding issue and significantly alleviates the environmental burden on the company's wastewater treatment facility. Additionally, this method produces a sulfate solution with a concentration of approximately 20%, which will allow for its future isolation and, consequently, an effective reduction of the salinity of the wastewater. The MO method has been developed at UCT Prague, subsequently also in cooperation with the companies Pento Spol. s r.o. and Messer Technogas s.r.o.. The result of the cooperation is the MO unit for sulfide liquors at Unipetrol with a capacity of 550 l/h, which was put into operation in 2021.

Table 3.4.1 - Overview of research results in the period under evaluation

| Type of result ²⁷ | Year of application | Name |
|--|---------------------|---|
| F - UTILITY MODEL, INDUSTRIAL MODEL | 2020 | Zinc biodegradable alloy |
| B - BOOK | 2020 | Sculptures and Towns – Moravia. Art in Public Space 1945–1989 |
| Z- PILOT PLANT, PROVEN TECHNOLOGY | 2022 | Production technology of dicyclopentadiene from light pyrolysis naphtha |
| Z- PILOT PLANT, PROVEN TECHNOLOGY | 2020 | HVO co-pyrolysis with atmospheric gas oil |
| Z- PILOT PLANT, PROVEN TECHNOLOGY | 2022 | Semi-production of corrosion sensors |
| B - BOOK | 2022 | Czech glass mosaic. History, technology, catalogue of exterior works |
| N - CERTIFIED METHODOLOGY, MEMORIAL OR TREATMENT PROCEDURE | 2019 | Methodology of disinfection and cleaning of textile materials used for seals attachment |
| Z- PILOT PLANT, PROVEN TECHNOLOGY | 2019 | New methanol column for VUAB Pharma Rožtoky |
| Other – KNOW HOW | 2023 | Spin-off Galochrom |

²⁷ Specify the specific type of result. Add rows as needed.

| | | |
|-----------------------------------|------|-------------------------------|
| Z- PILOT PLANT, PROVEN TECHNOLOGY | 2021 | Sulfide liquor oxidation unit |
|-----------------------------------|------|-------------------------------|

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)²⁸, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).²⁹

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

FCT co-operates with enterprises operating in the chemical, material, automotive, electrotechnical and energy industry partly within the framework of contract research, partly within the framework of joint projects. Thanks to FCT's reputation, FCT's institutes are often directly approached by industrial companies. Much of the co-operation is long-term. Major customers include Unipetrol, Škoda Auto, Preciosa, TEVA, Zentiva, AGC, Taminco, MSD, Motim refractories and ČEZ, so the co-operation is both local and global. The results of applied research obtained within the FCT in cooperation with companies are subsequently consulted with the Rector's Office for Research and Technology Transfer (R&TTO). R&TTO was centrally established at UCT Prague in order to provide support in the field of intellectual property protection, commercialization and transfer of the results generated at UCT Prague. In this area, the R&TTO cooperates with the vice-deans of individual faculties and individual heads of research groups. If a result with application potential is identified, the R&TTO provides an assessment of the technology, including a preliminary patent search and a basic analysis of the market potential. The R&TTO then recommends an IP protection strategy and a strategy for exploitation (further development, licensing, sale or establishment of a spin-off company).

The following five key-results were selected and briefly described:

²⁸ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

²⁹ If the commercialisation of R&D&I results is carried out in this way.

1) Spin-off Galochrom (2023) <https://www.galochrom.cz/>

Galochrom s.r.o. is historically the first Czech manufacturer of high-performance liquid chromatography (HPLC) columns and one of the first spin-off companies launched from the University of Chemistry and Technology Prague. HPLC columns are used for separating specific components from chemical mixtures in every laboratory, making them an indispensable part of nearly every research endeavour. However, the state-of-the-art products available on the market are far behind the current research findings and associated technology breakthroughs, the application of which will significantly benefit the end users. Therefore, we have decided to bring innovation into the HPLC industry by commercialising novel types of HPLC columns, which are being developed in Prof. Kohout's (CEO's) working group at UCT Prague. The university fully supports the realization of the spin-off and the envisioned technology transfer based on licensing the know-how by the Galochrom company. Each of our columns offers exceptional efficiency, repeatability, and quality at a competitive price. Galochrom's technology enables customers not to compromise on quality due to the high prices of the best available products. We target research institutions, pharma & biotech companies, including life-science SMEs. We offer not only the stationary phases, but also the complete method development for the target analyte (group of analytes). Galochrom was launched in September 2023 and already in December 2023, the company was awarded the second place in the European EIT Jumpstarter competition for spin-off and start-up companies (section Manufacturing). In 2024, we marketed the first chiral stationary phases and realized the first method development project and sold the first chiral column.

2) Z- PILOT PLANT, PROVEN TECHNOLOGY: Sulfide liquor oxidation unit (2021)

The new technology addresses the processing of waste sulfide leachates generated during the desulfurization of gasoline fractions at Unipetrol RPA in Litvínov at a rate of 500 liters per hour, ultimately resulting in the formation of harmless sodium sulfate. The concentration of sulfides in the process decreases from an initial level of around 50,000 mg/L to below 0.1 mg/L. This approach resolves a longstanding issue and significantly reduces the environmental burden on the company's wastewater treatment facility and produces a sulfate solution with a concentration of approximately 20%, which facilitates its isolation, thereby effectively reducing the salinity of the wastewater.

The process was investigated in a lab setting using a batch arrangement, and based on the results, simulations of entire process were conducted. Subsequently, a continuous system was constructed at the university for verification. Based on the outcomes of these experiments and simulations UCT executed a complete design of the technology at the level of Extended Conceptual Design. The design of the reactor module is entirely unique and is protected intellectual property of VŠCHT Prague (UV 32 770). VŠCHT further contributed to the project preparation as a licensor in the design, construction, and commissioning phases, which concluded in 2021.

3) Z- PILOT PLANT, PROVEN TECHNOLOGY: Production technology of dicyclopentadiene from light pyrolysis naphtha (2022)

Dicyclopentadiene (DCPD) is a dimer of cyclopentadiene (CPD) and serves as a significant raw material for the production of hydrocarbon and polyester resins, EPDM elastomers, specialty plastics, and related chemical specialties. The proposed technology facilitates the isolation of DCPD in broad range of commercial grades from the Light Pyrolysis Naphtha – a by product of the steam-

cracking process. The presented commercialization comprises process know-how and process documentation, which was developed as a result of applied research effort at UCT Prague in cooperation with Unipetrol Litvínov company in form of contract research. The innovative solution was granted a patent in 2012 (patent CZ 30319 B6). The innovation lies in solving the problem of undesired yellow product color, which could not be done by previous technology, and disallowed providing a colourless product of the required commercial parameters from cheap feedstocks. The investor, PKN ORLEN, invested 831 million CZK into the implementation of this technology. Based on the technical documentation and know-how provided by the technology authors, a production unit with a capacity of 26,000 tons of DCPD per year was launched in 2024. The installed capacity represents approximately 25% of the total production in Europe.

4) Z- PILOT PLANT, PROVEN TECHNOLOGY: HVO co-pyrolysis with atmospheric gas oil (2020)

The technology enables the co-processing of renewable materials, specifically Hydrotreated Vegetable Oils (HVO, such as used cooking oil). It utilizes steam cracking to convert HVO into high-value petrochemical commodities, which allows their integration into production processes rather than energy recovery. This method is more profitable and also more beneficial from an environmental protection standpoint as it retains carbon in the produced material instead of emitting CO₂ in exhaust gases. According to results from simulations and experimental tests, the co-processing of HVO with traditional feedstock can increase the yields of desired pyrolysis products. Furthermore, simulations and experiments suggest that the addition of HVO to traditional feedstock enhances its reactivity; thus, a slightly lower cracking temperature may be used for energy savings when implemented at a large scale. The UCT researchers were the exclusive authors of the experimental laboratory study and the development of a computer model for transferring results to full process scale. The verification was performed in cooperation with the industrial partner in framework of the technological grant project on full-scale unit processing 25 t/hr of feedstock.

5) Z- PILOT PLANT, PROVEN TECHNOLOGY: New methanol column for VUAB Pharma Rožtoky (2019)

VUAB Pharma is a significant producer and exporter of nystatin, which is used in the treatment of infections. Methanol is used as a solvent in its production and its recovery from waste aqueous solutions and recycling is a key factor in the unit economy. A key challenge that needed to be addressed was the fact that the waste methanol feed contains a solid phase, and during the distillation process, additional solid phases can form. This leads to equipment fouling. Therefore, the line had to be designed to allow for easy cleaning of critical components. UCT developed a design for a new rectification line, incorporating results of previous laboratory experiments with a real mixture and mathematical modeling of the regeneration process. The regeneration line successfully underwent trial operation in 2019 and is now operating at full capacity. The investment cost was approximately 20 million CZK. The cleaning can now be accomplished in a matter of hours, whereas the old system required days. The new equipment has a higher capacity while significantly reducing heat consumption. With the new line, it is possible to regenerate around 2,000 tons of methanol annually, which has facilitated an increase in nystatin production.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

| Type of revenue | Revenue (in thousands CZK/EUR) | | | | |
|--|--------------------------------|--------------------|-----------------------|-----------------------|----------------------|
| | 2019 | 2020 | 2021 | 2022 | 2023 |
| TailorMem – licence fee | 0/0 | 0/0 | 0/0 | 4 | 4 |
| Spolana | 0/0 | 0/0 | 0/0 | 0/0 | 32 |
| Donations to support research and scientific student activities (in total) | 7490 / 259 | 170 / 7 | 3524 / 139 | 2930 / 116 | 1158 / 46 |
| Total | 7490 / 259 | 170 / 7 | 3524 / 139 | 2934 / 116 | 1194 / 47 |

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

This is an important activity of UCT. FCT staff and students participate in regular university-wide activities: Summer School, Science Festival, Youth Academy, European Science Night. We also offer activities encouraging our students' interest in R&D&I: "Contact", an event introducing enterprises to students as potential employers, often through Alumni. At Student Scientific Conferences, students present their projects to the industry. The best works are rewarded both by industry and scientific organisations. Appearances of scientists in classical media and on social networks are supported by the UCT Communication Department. The following table lists the 10 most significant activities in the area in which FCT is heavily involved:

1) Guided excursions in mineralogical collection at UCT Prague - FCT (2019 – 2023)

The unique mineralogical collection at UCT Prague is the second largest collection in the Czech Republic. The staff of the Department of Solid State Chemistry provides guiding services and expert interpretation for organized excursions, especially for students from secondary and primary schools, as well as for interested professionals and the general public.

More details: <https://uchpel.vscht.cz/collections>

2) Summer school for high school teachers and high school students (2019 – 2023)

The Summer school Chemistry for Life is organized annually by the University of Chemistry and Technology Prague for high school chemistry teachers and their students. Over the course of three days, 12-15 professional lectures from various areas of chemistry (biochemistry, food chemistry, materials chemistry, chemistry in pharmacy and environmental protection) are presented. Participants can visit the laboratories of the University of Chemistry and Technology, where they can

try out simple experiments that can then be prepared for students at their high schools. Participation in the Summer School ranges from 110-130 teachers and 120-140 students.

3) CARBONCAST (2021 – 2023)

CarbonCast is the official university podcast of the UCT Prague, featuring interviews with distinguished individuals affiliated with the institution. The podcast explores topics ranging from science and research to university life and experiences beyond academia. Guests include academics, staff, students, and accomplished alumni.

More details: <https://creators.spotify.com/pod/show/carboncast0>

4) ScienceFest (2019 – 2023)

VědaFest (ScienceFest) is the largest open-air science outreach event in Czechia, held annually in the Dejvice district. The festival provides visitors with the opportunity to engage with the latest scientific discoveries through interactive exhibitions, hands-on experiments, and expert lectures. The Faculty of Chemical Technology (FCHT) is one of the principal organisers of the event and plays a key role in its regular programming.

5) Open Days at UCT Prague (DOD, 2019 – 2023)

The Open Days at UCT Prague are unique events designed for prospective students, offering them detailed insights into study programs at our university. Those interested can explore the university's facilities and laboratories, where an interactive and educational program is prepared, allowing them to meet academic staff as well as current students. The Faculty of Chemical Technology (FCT) actively co-organizes these Open Days. Additionally, our faculty is an active participant in the Open University program, where prospective students can experience life at UCT by accompanying one of our current students. This includes visiting the campus, attending lectures, and observing laboratory work.

6) Youth Academy (UCT Prague +DDM Prague) (2019 – 2023)

Organization of popularization lectures for secondary school students, 2019 - 2023 Lecturers from all over VŠCHT with a focus on lecturers who can captivate talented but still lay listeners with their speech.

7) University choir ChemChór, (2019 – 2023)

Singing in and leading a university choir supports the creativity of students and staff, facilitates new contacts and helps to connect study and work with everyday life. The ChemChór represents not only the faculty but also the entire university at public concerts and informal musical performances that are open to the general public.

More details: <https://aktivni.vscht.cz/clubs/culture/chemchor>

8) Zvědaví - audiovizuální profily (2022-2023)

The #Zvědaví project showcases a group of young individuals who have embarked on their scientific and technological journeys at VŠCHT. Through a series of audiovisual portraits, it documents their unique life paths driven by a desire to understand the world through the natural sciences. Members of the Faculty of Chemical Technology (FCHT) are an integral part of the project.

9) Secondary school of professional activities (2019 –2023)

The secondary school of professional activities is a competition of talented high school students in solving professional problems. It usually takes place in three rounds in the form of competition shows, in which the competitors defend their works. The most successful solvers are often selected to participate in similar international competitions. Full-time high school students can participate in the competition.

The secondary school professional activities is a voluntary hobby activity of students of all types of secondary schools, which they carry out in their schools, extracurricular facilities, clubs. The result is an independently developed work or teaching aid, which is submitted for professional assessment and is subsequently defended before a professional jury. The aim of the competition is to help find talented students, guide them to an independent and creative approach, support them and professionally develop their growth. Students have the opportunity to participate in professional activities that will deepen and improve their knowledge in an interesting and practical way.

10) University of the 3rd Age (U3V, 2019 –2023)

The University of the Third Age (U3V) is one of the forms of lifelong learning that the University of Chemical Technology in Prague (UCT Prague) implements as a member of the Association of Universities of the Third Age. The aim of the courses is to provide seniors with the opportunity to systematically familiarize themselves with the latest knowledge in the areas taught at the University of Chemical Technology in a qualified manner and at a university level. The organization of U3V courses is the basis for the continuous mental development of citizens of post-productive age, who not only expand their knowledge, but above all stimulate their interest in current events, the practical use of acquired knowledge and a constant active approach to life.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

The complete document *Implementation of the recommendations in Module 3*, including the text of the recommendations, can be found [here](#).

Implementation of IEP recommendations for 3.2 -3.4:

The efforts pursued involved: Continuing very open policy in approving project proposals (no topical limits, financial motivation, options for securing co-funding), Encouraging international cooperation (and supporting it for younger researchers), Enhancing Research Infrastructure (majority of available investment funds goes for RI od co-funding RI enhancement from operation programs).

FCT maintained a relatively rigid department structure for allocating teaching responsibilities, while the research and cooperation capabilities are communicated more at the faculty-research groups line, where the department structure presents no boundary in forming project research teams across departments and beyond.

Implementation of IEP recommendations for 3.5-3.6:

The efforts towards the implementation and commercialization of results were pursued and broadened. It involved further promoting our research teams, results and agenda specifically to prospective major partners, cooperating with Rector's Office for Research and Technology Transfer (R&TTO) in providing legal services to researchers, piloting spin-off formation (Galochrom), encouraging incubation opportunities in UCT (TACR SIGMA) and external (CzechInvest) frameworks. The key role of co-funded research projects and contract research projects is still maintained in terms of received funding, but other models are also used where possible. Apart from spin-off and patent licenses, the concept of industry co-funded doctorates and research also grows in importance. IEP specifically recommended strengthening the conservation of cultural heritage field. The support of this branch of high interest in society brought success in receiving 7 grants by the Ministry of Culture and accreditation of a doctoral study program.

Implementation of IEP recommendations for 3.7-3.9:

Sustained generation of results suitable for commercialization is fundamentally supported by faculty policy of counting theoretical and applied research outputs as equal in terms of evaluating researcher performance and supporting applied and industrial research projects equally. Thanks to this policy, numerous patent applications were filed, 18 patents were registered as well as 99 utility models, industrial patents, and prototypes within the evaluation period. Further development of obtained results is encouraged by the support of R&TTO, which provides services for international extension of patent protection, finding a license and providing legal assistance. Thanks to this support, 2 patents are registered by the European Patent Office and 3 patents registered during the evaluation period are licensed. Additionally, general license negotiations proceed for international patents related to lithium extraction technology, which the proof-of-concept phase was done within the evaluation period. Thus, this branch of commercialization is developing side by side with the contract/project

based industrial research represented by 22 pilot-plants/verified technologies delivered within the same period. Since many results of applied research projects emerge at a too low technology readiness level (TRL), support for increasing TRL is sought from internal (departments) or external sources. Facilities for pilot verification and incubation are to some extent available via Technopark or external sources (CzechInvest services). Creation of spin-offs is the least developed form of commercialization, because the formal support was relatively difficult to establish and the source of external funding is limited so far. However, R&TT now can provide adequate assistance to forming spin-offs and the first “Galochrom” spin-off was already launched at FCT in September 2023. It was awarded the second place in the European EIT Jumpstarter competition for spin-off and start-up companies and in 2024 it already marketed their first products. This achievement encourages followers, and two other spin-off ideas are being prepared.

Implementation of IEP recommendations for 3.10 - 3.11:

FCT react to such need by supporting younger scientists in their efforts to start their unique research topics and develop them. It starts with encouraging the PhD graduates to seek postdoctoral positions abroad, and then re-attract them back (or attract other scientists completing their postdocs) using grant opportunities and a good institutional environment as key attractors. Four prestigious GACR JuniorStar projects, five internal Dagmar Prochazkova Fund projects and also Experientia foundation grant allowed younger scientists to upgrade their careers to a new level and form junior research groups. Faculty tries to prioritize allocating available space to those young researchers to ensure sustained development of new topics and agendas. Good institutional environment includes different aspects of non-restricted grant application policy, cross-institutional collaborations, good research infrastructure, talented students and also certain university-wide benefits allowing to balance work and family life. Those efforts are quite successful in maintaining stable staff structure (as documented in table 3.1.1) and favorable age structure (table 3.1.2). For example, 9 professorship appointments were initiated in the evaluation period, where the candidate's age at the time of starting the process was 1x < 40yr, 6x 40-50yr, and 2x 50-60 yr.

Implementation of IEP recommendations for 3.12:

FCT is aware of the importance of this task, as it not only fulfills the social role of the university, but also helps attract prospective students to the university and faculty. Therefore, faculty invests considerable resources, both financial and human, to cover this sort of activity adequately. Section 3.6 provides an overview of the formally organized activities. However, there are also many individual activities such as lectures and presentations in high school lessons, partner high schools to cooperate in practical education, or incorporating pre-university students into research. Many of such activities are fully or partially organized by students of the faculty and FCT, and always seek to secure some funds to support the participants.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

| Document name | No. criteria | Location (link in HTML) |
|---|--------------|---|
| Guided excursions in mineralogical collection at UCT Prague | 3.6 | https://uchpel.vscht.cz/collections |
| Spotify CarbonCast | 3.6 | https://creators.spotify.com/pod/show/carboncast0 |
| University choir ChemChór | 3.6 | https://aktivni.vscht.cz/clubs/culture/chemchor |
| Implementation of the recommendations in Module 3 | 3.7 | https://www.vscht.cz/file/uzel/84537/0014~~M9YzV_DMLchJzU3NK0ksyczPU8hPUyjJSFUoS3OzwWKpoBFixUy8xR881NKc1IVjBXcnEMA.pdf |

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Chemical Engineering

FORD: 1 - Natural sciences

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment: The mission of the Faculty of Chemical Engineering (FCE) at the University of Chemistry and Technology in Prague (UCT) is to provide high-quality engineering education at the bachelor, master, and doctoral levels. The faculty specializes in analytical chemistry, physical chemistry, chemical engineering, measurement and control engineering, as well as informatics and cybernetics. Additionally, FCE teaches fundamental subjects such as mathematics, physics, and informatics across UCT faculties, contributing significantly to the UTC mission.

FCE systematically integrates research and education, incorporating the latest scientific findings into teaching and offering thesis topics aligned with current societal needs, such as pharmaceutical advancements, healthcare research, and sustainable technologies. This approach has led to a steady increase in student interest, enabling sustainable expansion in fundamental and applied research.

The systematic scientific and pedagogical activities of FCE positively influence performance in fundamental and applied research as well as in technology transfer. Between 2019 and 2023, two out of three new UCT spin-off companies were founded by FCE employees and students: MarbleMat and Levaré. Out of a total of 49 new patents, 14 originate from FCE. The faculty is involved in two prestigious EXPRO projects and three prestigious JUNIOR STAR projects, which are the Czech equivalent of ERC grants, following a similar evaluation and selection process and a similar budget. A key factor in achieving this success has been the long-term stays of all project leaders at prestigious universities in Europe and the USA.

A unique initiative, in which FCE staff play a fundamental role, is The Parc initiative. The Parc is a pharmaceutical research platform offering a post-graduate program that is based on collaboration between academic and industrial partners. The Parc creates an environment for talented students

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

who are able to solve current and future challenges of pharmaceutical research. Currently, 25 students are involved in The Parc, 18 of whom are FCE students. Fifteen students have already defended their PhD projects conducted within The Parc. Industrial partners have so far invested over 3.5 million CZK to support talented students.

The faculty fosters a rigorous yet supportive academic environment. High-quality theoretical, laboratory, and project-based education ensures graduates are well-prepared for the job market. FCE prioritizes hiring academic staff with prior international experience to enhance independent research skills and global best practices. The remuneration system for academic staff strictly takes into account the teaching and scientific performance, thus contributing to the creation of a competitive environment. The faculty imposes no quotas on academic staff or student numbers in individual departments. Programs such as student tutoring and junior academic mentoring contribute to a welcoming environment, supported by the UCT career and counseling center. FCE financially supports international research visits of doctoral students and outstanding scientific projects.

We are convinced that educating top professionals is our most significant and lasting contribution to society.

Research, development, and innovation (R&D&I) at FCE focuses on chemical sciences and chemical engineering. Additionally, the faculty engages in biological, physical, mathematical, and information sciences, as well as electrical and materials engineering and nanoscience. Chemical sciences primarily involve fundamental research, while chemical engineering spans both fundamental and applied research. In analytical and forensic chemistry, FCE develops diagnostic and forensic methodologies using chromatographic, electrochemical, and spectroscopic techniques. Collaborations with institutions such as the Criminalistic Institute, hospitals, and the Czech Police ensure practical applications.

The physical chemistry research at FCE involves ultrafast chemical phenomena, dynamic processes in electrolytes, photon-material interactions, and multimolecular structures like ribosomes. Findings are published in journals such as Nature Communications, Nature Chemistry, and Angewandte Chemie, contributing, e.g., to advancements in green hydrogen production and photocatalysis.

Chemical engineering research at FCE covers energy storage, catalyst development for the automotive industry, pharmaceutical material innovations, drug delivery systems, specialized chemical production in microfluidic reactors, etc. Collaboration with industrial partners accelerates the practical application of the research. This success has also led to the establishment of spin-offs Marblemat, Levare, and Pinflow. R&D&I activities of FCE have a strong international dimension, including partnerships with leading universities and industrial collaborations.

FCE consists of five Departments of: Analytical Chemistry, Physical Chemistry, Chemical Engineering, Physics and Measurements, and Mathematics, Informatics, and Cybernetics. While the Department of Physics and Measurements has fewer staff, it plays an important role in faculty-wide study programs and thesis supervision. FCE currently offers seven bachelor programs: Chemistry, Chemical Engineering and Bioengineering, Analytical and Forensic Chemistry, Nano and Microtechnologies in Chemical Engineering, Physical and Computational Chemistry, Chemical Cybernetics, and Chemistry and Technology (taught in English for self-funded students). The master programs include Chemical Engineering and Bioengineering, Sensorics and Cybernetics in Chemistry, Analytical Chemistry, Physical Chemistry, and Data Engineering in Chemistry. The Chemical Engineering and Bioengineering

program is also available as a double-degree (DD) in collaboration with Università degli Studi di Cagliari.

FCE offers doctoral programs in Czech and English, including Chemical and Process Engineering, Chemistry, Molecular Chemical Physics and Sensorics, and Measurement and Signal Processing in Chemistry. Some programs operate as DDs with partners such as KU Leuven, Universität Regensburg, Arctic University of Norway (Tromsø), Ecole nationale supérieure de chimie de Rennes, and Université Bourgogne Franche-Comté. These study programs reflect the scientific focus of FCE and international reputation.

The FCE system of the evaluation of academic staff has led to a slight reduction in Full-Time Equivalents (FTEs) from 207 to 196, while student numbers increased across all levels: bachelor students from 408 to 548, master from 200 to 257, and doctoral from 187 to 208. This indicates improved teaching efficiency and increased student interest. The number of professors and associate professors aged 40+ has risen, while FTEs in the 70+ category declined to 15, ensuring a balanced age structure for future faculty development. The gender ratio among academic staff is approximately 1:2, but among assistant professors, it is closer to 1:1, suggesting a future increase in women attaining senior positions. Parental leave is considered in evaluations for habilitation and professorship. Student enrollment is balanced between men and women.

Table 3.1.1 - Staffing per FTE²

| Academic/ Professional position | Total / Of which women | | 2021 | 2022 | 2023 | Total |
|--|------------------------|--------------|-------------|-------------|--------------|----------------|
| | 2019 | 2020 | | | | |
| Professor | 18.8 / 2 | 18.8 / 2 | 17.8 / 2 | 16.3 / 1.6 | 15.3 / 0.9 | 87 / 8.5 |
| Associate Professor | 25.6 / 1.9 | 25.3 / 2.5 | 23.2 / 2.2 | 22.4 / 2.2 | 21.3 / 2.1 | 117.8 / 10.9 |
| Assistant Professor | 61 / 23.5 | 63.4 / 24.5 | 61.9 / 24 | 61.4 / 24.3 | 62.7 / 24.8 | 310.4 / 121.1 |
| Assistant | 3.2 / 0.5 | 3.4 / 0.5 | 4 / 1 | 4.8 / 0.9 | 2.4 / 0.2 | 17.8 / 3.1 |
| R&D Personnel ³ | 70 / 23.6 | 73.7 / 23 | 66.6 / 21.2 | 65.4 / 20.8 | 70.1 / 26.5 | 345.8 / 115.1 |
| Researchers in other categories ⁴ | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Technical and economic staff ⁵ | 28.8 / 19 | 28.8 / 20.8 | 27.5 / 20.1 | 27 / 19.2 | 24.5 / 17.4 | 136.6 / 96.5 |
| Scientific, research and development staff involved in teaching activities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Early career researchers ⁶ | 16.4 / 5.8 | 17.8 / 6.4 | 21.9 / 7.8 | 23.7 / 9.6 | 23.5 / 8.1 | 86.9 / 31.9 |
| Total ⁷ | 207.4 / 70.5 | 213.4 / 73.3 | 201 / 70.5 | 197.3 / 69 | 196.3 / 71.9 | 1015.4 / 355.2 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 5 | 0 | 4 | 0 | 11 | 2 | 4 | 0 |
| Associate Professor | 0 | 0 | 5 | 0 | 10 | 0 | 6 | 2 | 8 | 1 | 4 | 1 |
| Assistant Professor | 0 | 0 | 40 | 17 | 19 | 8 | 14 | 7 | 4 | 3 | 5 | 0 |
| Assistant | 2 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ⁹ | 95 | 38 | 33 | 9 | 8 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| Researchers in other categories ¹⁰ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹¹ | 4 | 2 | 3 | 2 | 17 | 12 | 9 | 7 | 6 | 3 | 3 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹² | 0 | 0 | 19 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹³ | 101 | 41 | 84 | 28 | 60 | 20 | 33 | 16 | 30 | 9 | 17 | 1 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 7 | 0 | 6 | 0 | 7 | 0 | 6 | 1 |
| Associate Professor | 0 | 0 | 3 | 0 | 13 | 2 | 6 | 2 | 2 | 0 | 7 | 0 |
| Assistant Professor | 0 | 0 | 26 | 10 | 35 | 17 | 12 | 5 | 6 | 3 | 2 | 0 |
| Assistant | 2 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ¹⁵ | 87 | 23 | 32 | 17 | 8 | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| Researchers in other categories ¹⁶ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹⁷ | 0 | 0 | 2 | 1 | 12 | 8 | 9 | 7 | 3 | 1 | 0 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹⁸ | 4 | 0 | 31 | 13 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹⁹ | 89 | 23 | 67 | 29 | 75 | 30 | 34 | 14 | 18 | 4 | 15 | 1 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Table 3.1.4 – Students

| Type of study | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Undergraduate | 408 | 183 | 450 | 205 | 501 | 248 | 548 | 264 | 548 | 262 | 1396 | 707 |
| Master's ²⁰ | 200 | 89 | 184 | 84 | 218 | 101 | 252 | 116 | 257 | 131 | 669 | 315 |
| Doctoral | 187 | 66 | 203 | 67 | 218 | 70 | 206 | 65 | 208 | 73 | 232 | 78 |
| Lifelong Learning Courses | 84 | 50 | 34 | 19 | 53 | 43 | 36 | 25 | 29 | 19 | 236 | 156 |
| Total | 879 | 388 | 871 | 375 | 990 | 462 | 1042 | 470 | 1042 | 485 | 2533 | 1256 |

Table 3.1.5 - Study programmes in Czech/English

| Type of study programme | Total ²¹ / Of which professional study programmes | | | | | | | | | | | |
|---------------------------|--|---|------|---|------|---|------|---|------|---|-------|---|
| | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
| Undergraduate | 12 | 0 | 13 | 0 | 10 | 0 | 7 | 0 | 7 | 0 | 14 | 0 |
| Master's | 11 | 0 | 17 | 0 | 9 | 0 | 9 | 0 | 8 | 0 | 19 | 0 |
| Doctoral | 32 | 0 | 36 | 0 | 36 | 0 | 36 | 0 | 30 | 0 | 36 | 0 |
| Lifelong Learning courses | 3 | 2 | 3 | 2 | 3 | 2 | 4 | 3 | 6 | 5 | 6 | 5 |
| Total | 58 | 2 | 69 | 2 | 58 | 2 | 56 | 3 | 51 | 5 | 75 | 5 |

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

3.1.6 – R&D&I capacities

| R&D&I field | FORD | FORD share [%] | Predominant type of research | Total share of industry group [%] |
|---|---|----------------|-------------------------------------|-----------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | 3 | Basic Research | 58 |
| | 1.2 Computer and information sciences | 4 | Basic Research | |
| | 1.3 Physical sciences | 4 | Basic Research | |
| | 1.4 Chemical sciences | 39 | Basic Research | |
| | 1.5 Earth and related environmental sciences | 1 | Zvolte položku. | |
| | 1.6 Biological sciences | 6 | Basic Research | |
| | 1.7 Other natural sciences | 1 | Balanced basic and applied research | |
| 2. Engineering and Technology | 2.1 Civil engineering | 0 | Zvolte položku. | 38 |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | 3 | Applied Research | |
| | 2.3 Mechanical engineering | 0 | Zvolte položku. | |
| | 2.4 Chemical engineering | 25 | Balanced basic and applied research | |
| | 2.5 Materials engineering | 4 | Basic Research | |
| | 2.6 Medical engineering | 1 | Basic Research | |
| | 2.7 Environmental engineering | 0 | Zvolte položku. | |
| | 2.8 Environmental biotechnology | 0 | Zvolte položku. | |
| | 2.9 Industrial biotechnology | 1 | Applied Research | |
| | 2.10 Nanotechnology | 4 | Basic Research | |
| | 2.11 Other engineering and technologies | 0 | Zvolte položku. | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | 1 | Basic Research | 2 |
| | 3.2 Clinical medicine | 1 | Basic Research | |
| | 3.3 Health sciences | 0 | Zvolte položku. | |
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | 1 | Basic Research | 2 |
| | 4.2 Animal and Dairy science | 0 | Zvolte položku. | |
| | 4.3 Veterinary science | 0 | Zvolte položku. | |
| | 4.4 Other agricultural sciences | 1 | Balanced basic and applied research | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | 0 | Zvolte položku. | 0 |
| | 5.2 Economics and Business | 0 | Zvolte položku. | |
| | 5.3 Education | 0 | Zvolte položku. | |
| | 5.4 Sociology | 0 | Zvolte položku. | |
| | 5.5 Law | 0 | Zvolte položku. | |
| | 5.6 Political science | 0 | Zvolte položku. | |
| | 5.7 Social and economic geography | 0 | Zvolte položku. | |
| | 5.8 Media and communications | 0 | Zvolte položku. | |
| | 5.9 Other social sciences | 0 | Zvolte položku. | |

| R&D&I field | FORD | FORD share [%] | Predominant type of research | Total share of industry group [%] |
|----------------------------|--|----------------|------------------------------|-----------------------------------|
| 6. Humanities and the Arts | 6.1 History and Archaeology | 0 | Zvolte položku. | 0 |
| | 6.2 Languages and Literature | 0 | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | 0 | Zvolte položku. | |
| | 6.4 Arts (arts, history of arts, performing arts, music) | 0 | Zvolte položku. | |
| | 6.5 Other Humanities and the Arts | 0 | Zvolte položku. | |
| Total | | 100 % | - | 100 % |

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

FCE employees and students receive dozens of awards annually in the field of R&D&I. The selected results in Table 3.2.1 are thus only a cross-section of the awards received during the monitored period. FCE students receive significant awards both in student competitions and at international conferences, where they compete in the PhD student category. An example is Marie Švecová, who received an award from Metrohm for the best publication in the field of spectroscopy. Employees receive awards from both the ministries of the Czech Republic and organizations and foundations operating in the Czech Republic. A prestigious award in this area was received by Petr Mazúr (Neuron Award 2022 for the best connection of science and business).

Dozens of FCE academic staff are active members of the editorial boards of impacted international scientific journals, confirming their significant contribution to the scientific community. The faculty also has representatives in significant professional societies, which testifies to their professional authority and recognition in the scientific community.

FCE employees annually participate in dozens of international conferences, where they most often present their results in the form of lectures. Many of these are invited lectures, and a selection of them is listed in Table 3.2.3. Despite the COVID-19 pandemic, lectures were delivered, although movement restrictions significantly affected the total number of lectures conducted. Some of them were delivered at least online. The selection in the table represents lectures for the monitored period, with two selected for each year. They show the wide scientific scope of FCE and the diversity of places where FCE academic staff delivered their invited lectures. In addition to lectures at international conferences, they also presented lectures at leading world universities, for example in Korea, the UK, Israel, France, and Germany.

The COVID-19 pandemic also affected lectures by leading world experts at FCE. Despite this, dozens of lectures were delivered during the monitored period, a selection of which is in Table 3.2.4. These are lectures by scientists from significant foreign institutions, such as the University of Sydney, Australia; the University of Guelph, Canada; National Chung Cheng University, Taiwan; Institut des Sciences Chimiques de Rennes, France; and TU Dortmund, Germany.

FCE academic staff also actively participate in the evaluation of national and European project calls, confirming their professional competence and the trust placed in them by the scientific community. Jitka Čejková is particularly active, having participated in the evaluation of projects in several

international organizations, such as the French National Research Agency and the European Commission.

Overall, it can be said that the FCE enjoys high recognition in the scientific community, supported by a number of prestigious awards, active involvement of academic staff in the editorial boards of international scientific journals, membership in professional societies, significant invited lectures by FCE academic staff at foreign institutions or leading world experts at FCE, and participation in the evaluation of national and European project calls.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the award | Awarding institution |
|---|--|---|
| Ing. Adéla Jenišťová | Josef Hlávka Award for the best students and graduates of Prague public universities, Brno University of Technology, and young talented workers of the Academy of Sciences of the Czech Republic | Josef Hlávka Foundation |
| Ing. Marie Švecová | Metrohm Award for the best publication by a young electroanalytical chemist (under 35) in the field of UV-VIS-NIR spectroscopy and Raman spectroscopy | Metrohm |
| prof. Ing. František Štěpánek, Ph.D. | 22nd Werner von Siemens Award | Siemens |
| doc. Ing. Karel Friess, Ph.D. | Ministry of Education, Youth and Sports Award for outstanding research, experimental development, and innovation in the field of natural sciences | Ministry of Education, Youth and Sports |
| RNDr. Michal Kolář, Ph.D. | 2021 Humboldt Alumni Award | Alexander von Humboldt Foundation |
| prof. RNDr. Štěpán Urban, CSc. | Medal of the Police President 1st Class for long-term and proactive cooperation with the Police of the Czech Republic in the field of instrumental examination of odor traces, discovery of human odor signature molecules, digitization of odor traces, creation of the forensic field of Olfactronics, and unique contribution to the development of criminology | Police of the Czech Republic |
| Ing. Adam Baláž | 1st place in the Crytur Award 2022 | Crytur Foundation |
| Ing. Petr Mazúr, Ph.D. | Neuron Award 2022 for the best connection of science and business | Neuron Foundation |
| Ing. Lukáš Tomaník, Ph.D. | Dissertation Award from the Resonance Foundation | Resonance Foundation |
| Ing. Ivan Kopal | 1st place in the Competition for the best work by young authors in the field of spectroscopy 2022 | Jan Marek Marci Spectroscopic Society |

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of scientific journal, ISSN |
|---|--|
| Magdalena Bendová, Ing. Ph.D. HDR | Journal of Solution Chemistry, 0095-9782 |
| Magdalena Bendová, Ing. Ph.D. HDR | Journal of Chemical and Engineering Data, 0021-9568 |
| Viola Tokárová, doc. Ing. Ph.D. | IEEE Transactions on NanoBioscience; Electronic, 1558-2639 |
| Gabriela Broncová, Ing. Ph.D. | Chemosensors, 2227-9040 |
| Pavčina Basařová, doc. Dr. Ing. | Chemical Papers, 2585-7290. |
| Karel Friess, prof. Ing. Ph.D. | Separation and Purification Technology, 1873-3794 |
| Květoslav Růžička, prof. Ing. CSc. | Journal of Chemical Thermodynamics, 0021-9614 |
| Fatima Hassouna, doc. Dr. Mgr. | Chemical Papers, 2585-7290 |
| Mario Vazdar, PhD | Croatica Chemica Acta, 0011-1643 |
| Lucie Kolesníková, Ing. Ph.D. | Journal of Molecular Spectroscopy, 0022-2852 |

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Invited lecture title | Name of host institution, or name of conference or event | Year |
|---|---|---|------|
| Pavel Izák, doc. Ing. Ph.D., DSc. | Pervaporation in combination with ionic liquids | Ben-Gurion University of the Negev, Israel | 2019 |
| Jan Heyda, doc. RNDr. Mgr., Ph.D. | Thermodynamics and electrophoresis in light of Molecular Dynamics simulations and theory of solutions | Dpt. seminar, Institut Physikalische Chemie und Physik der Polymere, Leibniz-Institut für Polymerforschung Dresden, Germany | 2019 |
| Eva Muchova, doc. RNDr., Ph.D. | Modelling Photoinduced Processes in Molecular Systems | Molecular Sciences Research Hub, Imperial College London, United Kingdom | 2020 |
| Jitka Čejková, doc. Ing., Ph.D. | "Liquid robots are not cells" | University of Southern Denmark, Odense, Denmark | 2020 |
| Daniel Ondo, Ing., Ph.D. | Hydration and Solvation of N-isopropylacrylamide in Sodium and Guanidinium Salts: Experimental and Theoretical View | Seminar University of Rostock, Germany | 2021 |
| Lucie Kolesniková, Ing. Ph.D. | From Laboratory to Space: Generation and Spectroscopic Characterization of Molecules of Astrophysical Interest | Rennes Institute of Chemical Sciences, Rennes, France | 2021 |
| Michal Příbyl, prof. Ing., Ph.D. | Continuous flow microfluidics for the synthesis and separation of pharmaceuticals and enantiomers | KIChE Fall Meeting and International Symposium, Busan, Korea | 2022 |
| Karel Friess, prof. Ing. Ph.D. | Molecular-level engineering in the advanced separation membrane fabrication | KIChE Fall Meeting and International Symposium, Busan, Korea | 2022 |
| Petr Bouř, prof. RNDr. DSc. CSc. | Raman Optical Activity: Simulations Outside and In Resonance | 12th International Conference on Advanced Vibrational Spectroscopy, Krakow, Poland | 2023 |
| Mario Vazdar, PhD | How do different experimental conditions influence biophysical experiments? A molecular dynamics insight | Workshop, University of Veterinary Medicine, Vienna, Austria | 2023 |

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

| Name, surname and title(s) of the lecturer | Lecturer's employer at the time of the lecture | Invited lecture title | Year |
|--|---|--|------|
| Prof. Des R. Richardson | University of Sydney, Australia | Removing mitochondrial rust! A potential treatment strategy in the mitochondrial disease, Friedreich's ataxia. | 2019 |
| Prof. Timothy A. Keiderling | University of Illinois at Chicago, USA | Protein folding from the ground up. Thermodynamic and kinetic studies of peptides and proteins with increasing complexity. | 2019 |
| Prof. Gabriele Sadowski | TU Dortmund, Germany | PC-SAFT - a thermodynamic model for life-science applications | 2019 |
| Prof. Jean-Claude Guillemin | Institut des Sciences Chimiques de Rennes, France | Theoretical and experimental approaches to predict which organic compounds are present in the interstellar medium | 2020 |
| Prof. Christian Mayer | Universität Duisburg-Essen, Germany | Molecular Evolution in a Peptide-Vesicle System – The First Step Towards Life? | 2020 |
| Prof. Maria Filomena Barreiro, PhD. | Polytechnic Institute of Bragança, Portugal | Microencapsulation: a world of possibilities | 2021 |
| Prof. William R. Smith | Dpt. of Mathematics and Statistics, University of Guelph, Ontario, Canada | Discovering CO2 Capture Solvents by a Purely Predictive Combination of Electronic Structure and Atomistic Simulation Methodologies | 2022 |
| Prof. Mikael Lund | University of Lund, Sweden | Protein interactions in crowded solutions | 2022 |
| Prof. Mario Barbatti | Aix Marseille Uni. & CNRS, France | Mixed Quantum-Classical Dynamics for Modeling Molecular Photoprocesses | 2023 |
| Prof. Chien-Yen Chen | National Chung Cheng University, Taiwan | A unique biosurfactant Surfactin, its properties and application | 2023 |

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the research project/programme call | Name of the contracting authority/guarantor of the project/programme call | Year |
|---|--|---|------------|
| Michal Přebyl, prof. Ing., Ph.D. | P106 Technical chemistry | Czech Science Foundation | 2019-2021 |
| Michal Přebyl, prof. Ing., Ph.D. | External evaluator - Module 1, National M17+ evaluation | RDI Council, Czech republic | 2023- |
| Petr Bouř, prof. RNDr. DSc. CSc. | P208 Physical Chemistry | Czech Science Foundation | 2022-2023 |
| Pavel Izák, doc. Ing. Ph.D., DSc. | P208 Physical Chemistry | Czech Science Foundation | 2022-2023 |
| Jan Heyda, doc. RNDr. Mgr. Ph.D. | P208 Physical Chemistry | Czech Science Foundation | 2023- |
| Karel Friess, prof. Ing. Ph.D. | P106 Technical chemistry | Czech Science Foundation | 2023 |
| Jitka Čejková, doc. Ing., Ph.D. | HORIZON-MSCA-DN | European Commission | 2022, 2023 |
| Jitka Čejková, doc. Ing., Ph.D. | CE04 - Innovations scientifiques et technologiques pour accompagner la transition écologique | French National Research Agency (ANR) | 2021 |
| Jitka Čejková, doc. Ing., Ph.D. | ERC CZ | Ministry of Education, Youth and Sport of the Czech Republic | 2022 |
| Mario Vazdar, PhD | Marie Curie Sklodowska Postdoctoral Fellowship Evaluator | European Commission | 2021-2023 |

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment: A significant number of projects were supported at FCE (see 3.3.1 and 3.3.2), from which the following 10 prestigious national or international projects were selected:

1) The Open Research Biopharmaceutical Internships Support project (ORBIS); Co-applicant: prof. Štěpánek; 2018-2023; Research and Innovation Staff Exchange (RISE) call of Marie Skłodowska-Curie Actions (MSCA), Horizon 2020 programme

The Open Research Biopharmaceutical Internships Support project (ORBIS) was a response to the scientific, economic, and social challenge of increasing the effectiveness and productivity of the drug development process, both for innovative and (super)generic drugs. The overarching objective of the ORBIS project was to form a transnational and intersectoral cooperation network of academic and industrial organisations delivering a joint research programme. The research aimed at improving the preclinical pathway of drug development and manufacturing, focusing on technological and methodological improvements of the existing processes. The participating staff from all institutions have developed new skills, were exposed to new work and research environments, and have significantly broadened their career perspectives. More than 450 months of secondments were completed, and over 175 early-stage and experienced researchers participated in the exchange.

The ORBIS project strengthened the European human capital in pharma research and innovation and has formed the cornerstone for future cooperation on innovative science for the advancement of medicines, strengthening Europe's intellectual potential in the R&D sector.

8 universities and 5 pharmaceutical companies from 8 countries participated in the ORBIS project.

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

2) FlowCamp (European Training Network to improve materials for high-performance, low-cost next- generation redox-flow batteries); Co-applicant: Prof. Kosek; 2017-2022; Marie Skłodowska-Curie Actions

FlowCamp was an interdisciplinary training network of 15 doctoral students, covering the development of next-generation redox flow battery (RFB) technology. Currently the all-vanadium redox flow battery is the dominating flow battery technology for mid- to long-duration stationary storage. In FlowCamp three systems were chosen as next-generation flow battery systems to improve specific battery characteristics beyond the state of the art. These technologies were: 1) zinc slurry air RFBs for higher capacity 2) hydrogen bromine RFBs for higher power density and 3) aqueous organic RFBs for environmentally friendlier systems.

The complex interfaces of the scientific development of battery systems touch various disciplines in engineering. The interdisciplinary approach of the FlowCamp network combined material science, modelling and applied electrochemical engineering and spanned the whole development cycle from the modelling of battery cells and basic battery chemistry, the development of specialized battery materials like new membranes and catalysts to the development of complete cells and mini-stacks for the three chosen systems. The development was accompanied by an integrative training approach providing an interdisciplinary hub in which tomorrow's battery scientists were trained to face a fast-changing, competitive and challenging research environment.

In FlowCamp new cell concepts have been developed and tested in mini-stacks. Especially sealing concepts were a focus of the development. Cell concepts for slurry cells have also been designed. Cross-over phenomena in H₂-Br₂ cells have been investigated in-situ with segmented electrode measurements for the first time and new mitigation strategies have been proposed.

FlowCamp aimed to advance next-generation redox flow battery technology by developing innovative systems with higher capacity, power density, and environmental friendliness, while providing interdisciplinary training for future battery scientists.

In total 15 scientific articles covering the proposed research activities were published in international impacted journals. 10 institutions from 9 countries participated in the project.

3) Development of novel, high Performance hybrid TWV/GPF Automotive afterR treatment systems by raTionAL design: substitution of PGMs and Rare earth materials; Co-applicant: Prof. Kočí; 2016-2019; Horizon 2020 programme

To date, three way catalytic converters (TWCs) have been established as the most effective engine exhaust after-treatment system. However, TWCs not only fail to address the issue of particulate matter (PM) emissions but are also the main industrial consumer of Critical Raw Materials (CRMs) mainly Platinum Group Metals (PGMs) and Rare Earth elements (REEs), with the automotive industry accounting for 65%-80% of total EU PGMs demand. Addressing the necessity of CRMs reduction in catalysis, PARTIAL-PGMs proposed an integrated approach for the rational design of innovative nanostructured materials of low/zero PGMs/REEs content in a hybrid TWC/Gasoline Particulate Filter (GPF) for automotive emissions after-treatment. This

interdisciplinary project focused on identifying and fine-tuning the parameters involved in TWC/GPF preparation, characterization and performance evaluation under realistic conditions. PARTIAL-PGMs approach covered multiscale modeling, synthesis and nanomaterials' characterization, performance evaluation under realistic conditions as well as recyclability, health impact analysis and Life Cycle Assessment. The rational synthesis of nanomaterials used in these hybrid TWC/GPF systems allowed for a reduction of more than 35% in PGMs and 20% in REEs content, either by increasing performance or by their replacement with transition metals. The compact nature of the new hybrid system developed in this project not only allowed its accommodation in smaller cars, but it also reduced cold start emissions and light-off times.

PARTIAL-PGMs aimed to reduce the use of critical raw materials in automotive emissions after-treatment by developing innovative nanostructured materials for hybrid catalytic converters and particulate filters, enhancing performance and environmental sustainability.

In total 29 scientific articles covering the research activities were published in international impacted journals. 15 universities and companies from 11 countries participated in this project.

4) Neurodegenerative processes in patients exposed to methanol: prospective study after Czech mass methanol poisoning outbreak in 2012; Co-applicant: Prof. Sýkora; 2016-2019; Ministry of Health

The project represents the world's first prospective cohort study of the permanent consequences of methanol poisoning on the brain, vision, and peripheral nervous system. The results of the project were published in 25 articles with impact factor (total impact factor – 78.14; publications with maximum impact factor – 4.795 (Am J Ophthalm); median impact factor of published studies – 3.348), three more articles were submitted in 2019. A monograph was published in Karolinum Press in 2019. S. Zacharov. Challenges of Mass Methanol Poisoning Outbreaks. Authors results have been used in „Recommendations for the role of extracorporeal treatments in the management of acute methanol poisoning: a systematic review and consensus statement“; „Consensus statements on the approach to patients in a methanol poisoning outbreak.

Results of this interdisciplinary project have been used by European Commission - Commission Regulation (EU) 2018/589 of 18 April 2018 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Regulation, Evaluation, Authorization and Restriction of Chemicals (REACH).

The project received the Minister of Health Award for medical research and development.

5) Ab Initio Investigation of Polymorphism of Active Pharmaceutical Ingredients Supported by State of the Art NMR Crystallographic and Calorimetric Experiments; Applicant: Assoc. Prof. Červinka; 2019-2022; Ministry of Education, Youth and Sports

This INTER-EXCELLENCE project, carried out in cooperation between institutions in the Czech Republic and the USA (prof. Beran, University of California), represented basic research in the field of computational and experimental methods for modeling and describing the polymorphism of molecular crystals, especially active pharmaceutical ingredients and biogenic materials. This research topic is very attractive for subsequent applications in pharmaceutical or optoelectronic materials research, because it is very likely that research on pharmaceutically active materials or substances against serious diseases will continue intensively in the future.

The outcomes of this interdisciplinary project were published in 19 manuscripts in major professional journals, the vast majority of which belong to the first or second quartile of journals according to their impact in the fields of theoretical chemistry, crystallography or thermodynamics. This fact allows the broad scientific community to use the achieved results. The quality of the journals in which the results were published contributes to the broad impact of such published works. The impact of the project results was further significantly expanded through four invited lectures by the principal investigator at prestigious conferences such as WATOC or ACS meeting with global reach. The educational added value of the project can be highlighted as the successful completion of qualification theses by a number of participating students, which brings about the expansion of key competencies and expertise among the emerging generation of young Czech graduates.

This INTER-EXCELLENCE project advanced the modeling and description of molecular crystal polymorphism, with significant implications for pharmaceutical and optoelectronic materials research, and contributed to the scientific community through high-impact publications and educational achievements.

The project was evaluated as excellent by the Ministry of Education, Youth and Sports.

6) Membrane separation of acid gases from the air and modeling of the separation process; Applicant: Prof. Friess; 2020-2022; Ministry of Education, Youth and Sports

This INTER-EXCELLENCE project dealt with new composite membranes developed to effectively separate CO₂ and SO₂ from gas mixtures in the frame of international cooperation between institutions in the Czech Republic and the USA (Prof. Bara, University of Alabama). A synergistic combination of polymers and controllably-embedded nano additives increased the permeability and selectivity of acid gases. The results achieved (materials, preparation procedures, transport models) will serve for further collaborative research.

The results achieved during the project were published in the form of 10 Jimp articles in prestigious peer-reviewed journals focused on membrane technologies and materials research. In addition to obtaining experimental knowledge in the preparation of new composite materials and their testing, theoretical work related to the analysis of transport in membranes was successfully completed. The results were also presented to the professional public at international conferences organized in the USA and at joint seminars.

This INTER-EXCELLENCE project developed innovative composite membranes for efficient CO₂ and SO₂ separation, enhancing gas permeability and selectivity, and laying the groundwork for further collaborative research in membrane technologies.

The project was evaluated as excellent by the Ministry of Education, Youth and Sports.

7) Cohesive properties and phase equilibria of ionic liquids investigated by state of the art calculations and experiments; Applicant: Assoc. Prof. Červinka; 2019-2021; Czech Science Foundation - Junior Grants Programme

A robust methodology for first-principles predictions of sublimation of ionic liquids (ILs) was developed. The impact of the selection of the DFT computational set-up on the accuracy of the quasi-harmonic thermodynamic properties of crystalline ILs was thoroughly analyzed. The systematic hierarchy of the results predicted with various methods was interpreted, greatly contributing to the general understanding of the first-principles predictions of material properties.

The phase behavior of amorphous phases of ILs was also accounted for, and the polarizable force fields for MD simulations of ILs were benchmarked. The performance of the non-polarizable and polarizable all-atom force fields for the predictions of the glass transition temperatures of ILs by the trend-shift method was tested. It was concluded that the polarizable models significantly improved these predictions, justifying their higher computational cost.

Computational and experimental efforts were united to investigate the interactions of ILs with species forming hydrogen bonds of various strengths in their bulk phase. Curious non-monotonous trends of the excess heat capacity of alcohol-ionic liquid mixtures vs. temperature were revealed by calorimetric experiments, which were interpreted at the atomic level using MD simulations of the structure of bulk liquids and QM calculations of the hydrogen-bonding strength. Such simulated data were then processed by a two-state association model, qualitatively capturing the hierarchy of the hydrogen bonding strength, its gradual decay, and the excess heat capacities.

This interdisciplinary project developed a robust methodology for predicting the sublimation of ionic liquids, enhancing the understanding of their thermodynamic properties and interactions, with significant implications for material science and industrial applications.

In total 13 scientific articles covering the research activities were published in international impacted journals.

Within the theoretical part of the project, an intensive international cooperations with prof. Costa and prof. Pádua Gomes from École Normale Supérieure de Lyon, France were maintained.

The project was evaluated as excellent by the Czech Science Foundation.

8) Theoretical and experimental study of thermodynamic properties and phase behavior of molecular crystals; Applicant: prof. Fulem; 2017-2019; Czech Science Foundation

The goal of the project was to gain an insight into current possibilities of first-principles methods to provide reliable thermodynamic data for molecular crystals by performing benchmark studies against reliable critically assessed experimental data. The project consisted of two inherent parts: i) first-principles calculation of thermodynamic properties such as sublimation pressure, sublimation enthalpy and crystal heat capacities and ii) development of reference experimental thermodynamic data by performing new experimental studies and by critical evaluation of available literature data (based on tests of thermodynamic consistency, etc.). The envisaged goals of the project were accomplished. In total 19 scientific articles covering the proposed research activities were published in international impacted journals. Computational methodologies for calculation of sublimation thermodynamic properties were developed and their uncertainties were evaluated based on comparison with critically evaluated experimental data. The developed computational methodologies were further applied for prediction of polymorphic phase diagram and were used to calculate the cohesion properties and sublimation enthalpies of extremely low volatile 20 proteinogenic α -amino acids. The research activities initiated in this project continued in another project (COST project OC-2019-1-24017 "Bringing Theoretical and Experimental Polymorph Stability Ranking Together").

This project advanced the reliability of first-principles methods for predicting thermodynamic properties of molecular crystals, with significant implications for material science and pharmaceutical research.

The international co-operation related to this project included: prof. Beran (University of California, USA), prof. Santos (University of Porto, Portugal), Dr. Bazyleva (National Institute of Standards and Technology, USA), and Dr. Pinho (Polytechnic Institute of Bragança, Portugal).

The project was evaluated as excellent by the Czech Science Foundation.

9) From laboratory to space: generation and spectroscopic characterization of interstellar molecules, Applicant: Dr. Kolesnikova; 2019-2022; Czech Science Foundation

Three organic solids were probed with the aim to explore photo-fragmentations of precursors containing different functional groups that are appealing from the astrochemical point of view. Results were more than surprising; it was possible to generate around 40 species from a single precursor. An important outcome was the first generation of NH_2CCCN , a larger variant of interstellar cyanamide, in the laboratory. Laser ablation of organic solids has been proven as an innovative and powerful tool for the generation of astromolecules. The results represent a significant breakthrough (paper in *Angew. Chem.*).

The choice for complex organic molecules (COMs) was driven by actual interstellar detections and trends in molecular astrophysics. We aimed molecules from the families of nitriles, isocyanates, aldehydes, and ketenes that, thanks to the availability of new data from ALMA or due to the gaps in spectroscopic characterizations, required our attention with more urgency.

No commercial samples were available for the majority of target species and had to be synthesized or produced in situ. Our work led to 9 publications and delivered high-precision data that are timeless regardless of current radioastronomical capabilities.

Within the project, an intensive international cooperations with Prof. Guillemin (Ecole Nationale Supérieure de Chimie de Rennes, France), Prof. Alonso (University of Valladolid, Spain), Dr. Belloche (Max-Planck-Institut für Radioastronomie, Germany), Dr. Müller (Universität zu Köln, Germany), Dr. Coutens (Institut de Recherche en Astrophysique et Planétologie, Université de Toulouse, France), Dr. Jørgensen (Niels Bohr Institute, University of Copenhagen, Denmark), Dr. R. T. Garrod (University of Virginia, USA), and Prof. Z. Kisiel (Polish Academy of Sciences, Warszawa, Poland) were maintained.

This interdisciplinary project demonstrated the innovative use of laser ablation to generate astromolecules from organic solids, significantly advancing astrochemical research and leading to the first laboratory generation of NH₂CCCN.

The project was evaluated as excellent by the Czech Science Foundation.

10) Gas-liquid interface study using thermography; Applicant: Assoc. Prof. Rejl; 2020-2022; Czech Science Foundation

During the project three apparatuses were built. Apparatus A should provide the proof of concept of entire project. It is a tank in which the temperatures of the phases differ, and the heat is transported from the humid air to the liquid water. Temperature of both phases and partial pressure of the water in the gas is monitored. The results proved that 1) the thermal camera reads the temperature of the uppermost surface of the liquid and is not affected by the temperatures of the bulks of the phases; 2) the hypothetical concept of the interface with specific temperature and composition is in fact an observable reality.

Apparatus B confirmed the possibility to identify the mass-transfer intensity of the liquid surface via thermography using con-focal Raman microscope.

Apparatus C is a distillation unit consisting of peripheries and the core part simulating portion of the packed bed. The experiments with IR opaque systems proved observability of the dead spaces artificially created in the film, while utilization of the IR translucent systems provided an unexpected byproduct – the possibility to determine instantaneous field of the liquid film thickness. Thermograms of the positive and negative distillation system demonstrated that the liquid phase of the negative system forms rivulets, while the positive system wets the underlying sheet completely. The results have been put into context with observed decreased mass-transfer efficiency achieved with the negative system in the packed distillation column.

The research group involved in the project got familiar with the design of the mass & heat transfer involving apparatus and with formulation of radiative models and techniques for obtaining their parameters.

This project developed innovative apparatuses to study mass and heat transfer processes, providing valuable insights into phase interfaces and improving the efficiency of distillation systems.

The project was evaluated as excellent by the Czech Science Foundation.

Table 3.3.1 Projects supported by public funds

| In the role of beneficiary | | | | | | |
|----------------------------|---|--------------------------------|--------------|--------------|------------------|-----------------|
| Provider ²⁵ | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | The Open Reasearch Biopharmaceutical Internships Support project (ORBIS) | 0 / 0 | 0 / 0 | 0 / 0 | 1198 / 47 | 849 / 33 |
| European comission | | 0 / 0 | 0 / 0 | 0 / 0 | 1198 / 47 | 849 / 33 |
| GACR | Characterisation of inorganic nanoparticles by ultra-fast inductively coupled plasma mass spectrometry | 1070 / 42 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Development of fluorescent probes for determination of content, localization and trafficking of cholesterol within eukaryotic cells | 2005 / 79 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Theoretical and experimental study of thermodynamic properties and phase behavior of molecular crystals | 1307 / 52 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | New efficient membranes for effective H ₂ / CO ₂ separation (HySME) | 2448 / 97 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Reaction-transport fundamentals in integrated microfluidic bioreactors-separators operating with aqueous two-phase systems | 1783 / 70 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Synthesis of biomimetic nanoparticulate materials using a microfluidic platform and investigation of their interaction with cells | 1626 / 64 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Detection mechanisms on chemiresistors with a sensitive layer based on nanostructured oxides | 3834 / 151 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Towards the understanding of evaporation induced pattern formation of decanol droplets | 1577 / 62 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |

| In the role of beneficiary | | | | | | |
|----------------------------|--|------------|------------|------------|-------|-------|
| GACR | In situ monitoring and modeling of the solvation processes of active pharmaceutical ingredients | 2350 / 93 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Low temperature reaction kinetics in oxidation catalysts for diesel exhaust gas aftertreatment | 1626 / 64 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | New multibinding (pseudo)stationary phases for chromatographic and electromigration separations of (bio)molecules. | 3243 / 128 | 3243 / 128 | 150 / 6 | 0 / 0 | 0 / 0 |
| GACR | Study of plasticization of polymeric membranes and thermodynamics of multicomponent sorption for the development of effective membrane separations | 1501 / 59 | 1438 / 57 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Weak Interactions in Terahertz Spectroscopy | 1566 / 62 | 1566 / 62 | 542 / 21 | 0 / 0 | 0 / 0 |
| GACR | Black metals for utilization in quartz crystal microbalance gas sensors | 3019 / 119 | 3006 / 119 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Interactions of charged polymers with heterogeneous ion-exchange membranes | 1278 / 50 | 1241 / 49 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Intensification of reaction-diffusion processes by magnetic nanomixing | 2930 / 116 | 2930 / 116 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Droplets, ice and aerosols in silico: Combining ab initio and classical approaches | 1481 / 58 | 1481 / 58 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Templated Synthesis of Hydrogel Microparticles for Biomedical Applications | 1942 / 77 | 1942 / 77 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Transforming molecules with X-rays: Ab initio simulations in liquids | 1976 / 78 | 1976 / 78 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Constrained analysis of reaction networks - a tool for experimental validation of models of biochemical and photobiological reactors | 2436 / 96 | 2368 / 93 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Nanostructured heterojunctions for chemiresistors | 3430 / 135 | 3430 / 135 | 3430 / 135 | 0 / 0 | 0 / 0 |
| GACR | Stability of amorphous solid dispersions: Predictions by SAFT equations of state and their experimental verification | 2833 / 112 | 2733 / 108 | 2708 / 107 | 0 / 0 | 0 / 0 |

| In the role of beneficiary | | | | | | |
|----------------------------|--|-------------|------------|-------------|------------|------------|
| GACR | Cohesive properties and phase equilibria of ionic liquids investigated by state of the art calculations and experiments | 1467 / 58 | 1498 / 59 | 1461 / 58 | 0 / 0 | 0 / 0 |
| GACR | Structure and dynamics of the ribosome exit tunnel | 1128 / 44 | 1273 / 50 | 1317 / 52 | 0 / 0 | 0 / 0 |
| GACR | New composite membranes for targeted gas and vapour separations (CoMeTS) | 1808 / 71 | 1808 / 71 | 1808 / 71 | 0 / 0 | 0 / 0 |
| GACR | Microstructure of catalytic filters for automotive exhaust gas aftertreatment | 1992 / 79 | 1992 / 79 | 1992 / 79 | 0 / 0 | 0 / 0 |
| GACR | Particle-based models of polymer latexes at realistic temporal and spatial scales | 1852 / 73 | 1852 / 73 | 1852 / 73 | 0 / 0 | 0 / 0 |
| GACR | From laboratory to space: generation and spectroscopic characterization of interstellar molecules | 1189 / 47 | 1032 / 41 | 945 / 37 | 243 / 10 | 0 / 0 |
| GACR | The robotic nano-pharmacist: Next-generation manufacturing processes for personalised therapeutic agents | 15050 / 594 | 8385 / 331 | 8385 / 331 | 8385 / 331 | 8385 / 331 |
| GACR | Microfluidic reactors with embedded semi-permeable membranes for the preparation of special chemicals | 0 / 0 | 3248 / 128 | 3286 / 130 | 3311 / 131 | 0 / 0 |
| GACR | Towards Accurate Computational Spectroscopy: Merging Quantum Mechanics with Statistical Techniques | 0 / 0 | 1366 / 54 | 2423 / 96 | 2423 / 96 | 0 / 0 |
| GACR | Gas-liquid interface study using thermography | 0 / 0 | 1692 / 67 | 1701 / 67 | 1611 / 64 | 0 / 0 |
| GACR | Analysis of electrodialysis in milifluidic flow-through systems | 0 / 0 | 1992 / 79 | 1897 / 75 | 1897 / 75 | 0 / 0 |
| GACR | Insight in preferential interactions, bridging, and cononsolvency on PNIPAM by experimental and computational thermodynamics | 0 / 0 | 2041 / 81 | 1683 / 66 | 1671 / 66 | 0 / 0 |
| GACR | New superhydrophobic perfluorinated nanomaterials for advanced micro and bio applications | 0 / 0 | 0 / 0 | 2668 / 105 | 2668 / 105 | 0 / 0 |
| GACR | Decontamination of sensitive materials using cold atmospheric plasma technology for efficient and inexpensive (affordable) elimination of epidemic viruses | 0 / 0 | 0 / 0 | 1208 / 48 | 1177 / 46 | 1140 / 45 |
| GACR | Probing and Transforming Matter by Electrons in Liquid Jets | 0 / 0 | 0 / 0 | 11153 / 440 | 8986 / 354 | 9285 / 366 |

| In the role of beneficiary | | | | | | |
|----------------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| GACR | Inactivation of mould growth on surfaces of building materials using low temperature atmospheric plasma | 0 / 0 | 0 / 0 | 0 / 0 | 2516 / 99 | 2732 / 108 |
| GACR | Rational design of drug delivery systems based on tailored biodegradable polymers using an iterative in silico and experimental approach | 0 / 0 | 0 / 0 | 0 / 0 | 3034 / 120 | 2660 / 105 |
| GACR | Computer-aided design of catalytic filters considering the impact of trapped particulate matter | 0 / 0 | 0 / 0 | 0 / 0 | 2125 / 84 | 2125 / 84 |
| GACR | Optical Properties throughout Chemical Space via Machine Learning | 0 / 0 | 0 / 0 | 0 / 0 | 382 / 15 | 1573 / 62 |
| GACR | Solvatochromic glass slides and silica powders as chemical transducers enabling spectrophotometry of colorless fluids in visible region | 0 / 0 | 0 / 0 | 0 / 0 | 1898 / 75 | 1844 / 73 |
| GACR | Properties of liquids exposed to pressurized methane, ethane and hydrogen | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1398 / 55 |
| GACR | Making ab initio modelling possible for disordered molecular semi-conductive materials | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 7385 / 291 |
| GACR | Towards atomistic understanding of the first moments in the life of protein | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1219 / 48 |
| GACR | Soft micromachines for mechanic stimulation and biosensing in cell-on-chip | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1024 / 40 |
| GACR | Time-dependent simulations for time-resolved electronic spectroscopies | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1680 / 66 |
| GACR | Atoms to nanoparticles to atoms - predicting evolving catalyst activity under inherently transient conditions | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2042 / 81 |
| GACR | Development of inhalable carriers for in-situ production of natural antibiotics | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2709 / 107 |
| GACR | Copper-based enhancing substrates for advanced vibrational spectroscopies | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 304 / 12 |
| GACR | | 71741 / 2830 | 55533 / 2191 | 50609 / 1996 | 42327 / 1670 | 47505 / 1874 |

| In the role of beneficiary | | | | | | |
|--|---|-------------------|-------------------|-------------------|-------------------|-------------------|
| Ministry of Education, Youth and Sports | Development of Advanced Computational Algorithms for evaluating post-surgery rehabilitation | 0 / 0 | 1413 / 56 | 1376 / 54 | 1370 / 54 | 0 / 0 |
| Ministry of Education, Youth and Sports | Ab Initio Investigation of Polymorphism of Active Pharmaceutical Ingredients Supported by State of the Art NMR Crystallographic and Calorimetric Experiments. | 2083 / 82 | 2133 / 84 | 2195 / 87 | 2208 / 87 | 0 / 0 |
| Ministry of Education, Youth and Sports | Membrane separation of acid gases from the air and modeling of the separation process | 0 / 0 | 1575 / 62 | 1625 / 64 | 1675 / 66 | 0 / 0 |
| Ministry of Education, Youth and Sports | Exploration of properties and preparation of metalloporphyrin derivatives of Träger's, spiro-Träger's, and oligo-Träger's bases | 342 / 13 | 2113 / 83 | 2113 / 83 | 2113 / 83 | 0 / 0 |
| Ministry of Education, Youth and Sports | Nanocarbon composite materials for thin layer chemical gas sensors and photovoltaics | 727 / 29 | 168 / 7 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Black metals decorated with surface receptors as high-potentiality materials for gas sensing | 0 / 0 | 0 / 0 | 0 / 0 | 120 / 5 | 26 / 1 |
| Ministry of Education, Youth and Sports | | 3152 / 124 | 7402 / 292 | 7309 / 288 | 7486 / 295 | 26 / 1 |
| Ministry of Health | Multifunctional Nano-Clusters as a Drug Delivery System | 2308 / 91 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Health | Combination of new cannabinoids and advanced formulation methods for treatment of rheumatoid arthritis | 0 / 0 | 0 / 0 | 0 / 0 | 2735 / 108 | 4016 / 158 |
| Ministry of Health | | 2308 / 91 | 0 / 0 | 0 / 0 | 2735 / 108 | 4016 / 158 |
| Ministry of Industry and Trade | Disinfectant microparticles with prolonged protective effect and method for its evaluation | 0 / 0 | 0 / 0 | 1044 / 41 | 1293 / 51 | 0 / 0 |
| Ministry of Industry and Trade | | 0 / 0 | 0 / 0 | 1044 / 41 | 1293 / 51 | 0 / 0 |
| Ministry of the Interior | Development of a special device for the human scent collection | 2850 / 112 | 2244 / 89 | 900 / 36 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Digitization of the human scent signature for applications in the criminology and in a battle with the terrorism | 1864 / 74 | 1847 / 73 | 687 / 27 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Detection of peroxide explosives | 2062 / 81 | 2134 / 84 | 661 / 26 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Advanced semiconductor sensors for hazardous industrial gases | 1557 / 61 | 4637 / 183 | 4588 / 181 | 4394 / 173 | 0 / 0 |

| In the role of beneficiary | | | | | | |
|---------------------------------|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| Ministry of the Interior | The formation of an international community in the field of "Forensic Olfactronics" | 0 / 0 | 0 / 0 | 1745 / 69 | 1944 / 77 | 0 / 0 |
| Ministry of the Interior | Identification of the perpetrator by forensic analysis of smell and touch traces found at the crime scene | 0 / 0 | 0 / 0 | 14968 / 590 | 9067 / 358 | 9190 / 363 |
| Ministry of the Interior | Identification of shooter | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2612 / 103 |
| Ministry of the Interior | | 8333 / 329 | 10862 / 428 | 23551 / 929 | 15405 / 608 | 11801 / 466 |
| Other foreign | Ion Exchange in Nano Particle Membranes | 378 / 15 | 23 / 1 | 0 / 0 | 0 / 0 | 4 / 0 |
| Other foreign | Electrostatic charging of polyolefin powders on the level of particles | 0 / 0 | 337 / 13 | 736 / 29 | 918 / 36 | 900 / 35 |
| Other foreign | Towards better academic culture through sharing czexpats' experience | 0 / 0 | 0 / 0 | 52 / 2 | 117 / 5 | 140 / 6 |
| Other foreign | | 378 / 15 | 360 / 14 | 788 / 31 | 1035 / 41 | 1043 / 41 |
| TACR | SPREJOBOT: A robot for speeding-up drug formulation | 1689 / 67 | 2169 / 86 | 343 / 14 | 0 / 0 | 0 / 0 |
| TACR | Encapsulator for preperation of liquid marbles | 1965 / 77 | 2585 / 102 | 643 / 25 | 0 / 0 | 0 / 0 |
| TACR | Improving drug properties using advanced multi-component forms of active substances | 2605 / 103 | 2962 / 117 | 686 / 27 | 0 / 0 | 0 / 0 |
| TACR | Movement automation of CNC router head for more accurate fabrication of microfluidic chips | 1412 / 56 | 2518 / 99 | 1104 / 44 | 0 / 0 | 0 / 0 |
| TACR | Method of drug form production, personalized to fit the needs of a specific patient using mathematical simulation and 3D printing | 1436 / 57 | 1544 / 61 | 495 / 20 | 0 / 0 | 0 / 0 |
| TACR | Prototype development of the hydrogen concentration measurement device for primary circuit of nuclear reactor and the software for its prediction. | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1723 / 68 |
| TACR | | 9106 / 359 | 11779 / 465 | 3272 / 129 | 0 / 0 | 1723 / 68 |
| TOTAL | | 95023 / 3748 | 85935 / 3390 | 86574 / 3415 | 71480 / 2820 | 66963 / 2642 |

| | | | | | | |
|---------------------------|--|-------------------|-------------------|-------------------|-------------------|-----------------|
| European comission | Enhancing skills intelligence and integration into existing PhD programmes by providing transferable skills training through an open online platform | 0 / 0 | 94 / 4 | 325 / 13 | 892 / 35 | 0 / 0 |
| European comission | European Training Network to improve materials for high-performance, low-cost next-generation redox-flow batteries | 1371 / 54 | 1396 / 55 | 1017 / 40 | 469 / 18 | 0 / 0 |
| European comission | Development of novel, high Performance hybrid TWV/GPF Automotive after treatment systems by rational design: substitution of PGMs and Rare earth materials | 2083 / 82 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | Fluorescence and Reactive oxygen Intermediates by Neutron Generated electronic Excitation as a foundation for radically new cancer therapies | 1978 / 78 | 2997 / 118 | 2460 / 97 | 1831 / 72 | 236 / 9 |
| European comission | "MiE!" Doctoral network for microprocess engineering for electrosynthesis - new synthesis concepts for pharmaceutical/ fine chemical industry | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 363 / 14 |
| European comission | | 5432 / 214 | 4487 / 177 | 3801 / 150 | 3192 / 126 | 599 / 24 |
| GACR | Molecular Clusters as Unique Nano-reactors: Controlling Chemistry with Photons and Electrons | 984 / 39 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Novel blood-based biomarkers for early diagnosis, prognosis and progress of Alzheimer's disease | 1572 / 62 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Multicriteria Optimization of Shift-Variant Imaging System Models | 505 / 20 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Dynamics of unsteady phenomena in gas-liquid systems | 841 / 33 | 835 / 33 | 835 / 33 | 0 / 0 | 0 / 0 |
| GACR | Performance of structures with timber fire protection – multi-physics modelling | 406 / 16 | 518 / 20 | 425 / 17 | 0 / 0 | 0 / 0 |
| GACR | Study of the initial self-assembly processes during the formation of biomimetic anchor layers | 0 / 0 | 441 / 17 | 427 / 17 | 428 / 17 | 0 / 0 |
| GACR | Neuropeptide FF-2 receptor as a potential anti-obesity target: Impact of new analogs of RF-amide peptides | 0 / 0 | 0 / 0 | 415 / 16 | 581 / 23 | 581 / 23 |
| GACR | Elastic nanosilicon for advanced Li-ion batteries | 0 / 0 | 0 / 0 | 1066 / 42 | 1078 / 43 | 1078 / 43 |

| | | | | | | |
|--|--|-------------------|------------------|-------------------|-------------------|-------------------|
| GACR | Capacitive Deionisation: Insights from Molecular Modelling | 0 / 0 | 0 / 0 | 749 / 30 | 996 / 39 | 996 / 39 |
| GACR | Interplay between ghrelin and its novel endogenous antagonist LEAP2: possible role in the pathology of obesity | 0 / 0 | 0 / 0 | 0 / 0 | 468 / 18 | 640 / 25 |
| GACR | Advanced chemoresistive device based on gas sensitive single-1D nanostructures (1D-SENS) | 0 / 0 | 0 / 0 | 0 / 0 | 1089 / 43 | 1089 / 43 |
| GACR | Formation of droplets in rapid expansions: Between unary, binary, and heterogeneous paths. | 0 / 0 | 0 / 0 | 0 / 0 | 363 / 14 | 381 / 15 |
| GACR | Black metals surface-decorated by MXenes as sensitive chemiresistor layers | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1058 / 42 |
| GACR | Organelle translation as an evolutionary playground | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 506 / 20 |
| GACR | Nanocrystal Photoluminescence Intermittency: Elucidation of long-term charge carrier dynamics through ultrafast processes | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 850 / 34 |
| GACR | | 4308 / 170 | 1794 / 71 | 3917 / 155 | 5003 / 197 | 7197 / 283 |
| Ministry of culture | Progressive fire fighting with water mist in cultural heritage buildings | 0 / 0 | 188 / 7 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of culture | | 0 / 0 | 188 / 7 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Czech National Node to the European Infrastructure for Translational Medicine | 1450 / 57 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Czech National Node to the European Infrastructure for Translational Medicine | 0 / 0 | 725 / 29 | 725 / 29 | 725 / 29 | 0 / 0 |
| Ministry of Education, Youth and Sports | Research of selenium-enriched lactic acid bacteria, bifidobacteria and yeasts and influence of low-pH stress exposure on their selenium biotransformation efficiency | 0 / 0 | 375 / 15 | 565 / 22 | 508 / 20 | 157 / 6 |
| Ministry of Education, Youth and Sports | Czech National Node to the European Infrastructure for Translational Medicine | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 535 / 21 |
| Ministry of Education, Youth and Sports | | 1450 / 57 | 1100 / 43 | 1290 / 51 | 1233 / 49 | 692 / 27 |
| Ministry of Health | The development of novel analytical approaches for early diagnosis of adenomatous polyps and prevention of colorectal carcinoma | 0 / 0 | 1394 / 55 | 2046 / 81 | 2046 / 81 | 2046 / 81 |

| | | | | | | |
|---------------------------------------|---|-------------------|-------------------|-------------------|-------------------|-------------------|
| Ministry of Health | Early diagnostics of hepatocellular carcinoma in patients with liver cirrhosis by novel molecular spectrometric biomarkers in blood plasma | 1252 / 49 | 1896 / 75 | 1896 / 75 | 1896 / 75 | 756 / 30 |
| Ministry of Health | Neurodegenerative processes in patients exposed to methanol: prospective study after Czech mass methanol poisoning outbreak in 2012 | 1029 / 41 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Health | Natural bioactive compounds encapsulated in glucan microparticles as biomaterials suitable in the treatment of inflammatory bowel diseases | 1253 / 49 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Health | Efficacy of new spectroscopic biomarkers for detection of early stage pancreatic cancer | 1483 / 59 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Health | | 5017 / 198 | 3290 / 130 | 3942 / 156 | 3942 / 156 | 2802 / 111 |
| Ministry of Industry and Trade | NewSurf: New Surface Treatment Method for Neenzymatic Harvesting of Cells for Pharmacological or Medical Use | 2500 / 99 | 2796 / 110 | 3245 / 128 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Chemiresistors Based on Nanocomposite Layers for Gas Detection | 1373 / 54 | 1367 / 54 | 652 / 26 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Electromembrane modules for high temperature operation with system of active tightening force control | 752 / 30 | 1677 / 66 | 2097 / 83 | 395 / 16 | 0 / 0 |
| Ministry of Industry and Trade | Equipment for the manufacture of hollow fibres membrane modules | 933 / 37 | 1400 / 55 | 1400 / 55 | 467 / 18 | 0 / 0 |
| Ministry of Industry and Trade | | 5558 / 219 | 7240 / 286 | 7394 / 292 | 861 / 34 | 0 / 0 |
| Ministry of the Interior | Accidental release of CNG from passenger vehicles | 646 / 25 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Fire development modelling of engineered wood | 835 / 33 | 631 / 25 | 715 / 28 | 715 / 28 | 0 / 0 |
| Ministry of the Interior | Advanced techniques of visualization of dactyloscopic traces | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1987 / 78 |
| Ministry of the Interior | | 1481 / 58 | 631 / 25 | 715 / 28 | 715 / 28 | 1987 / 78 |
| Other foreign | Two-phase simulation of bioreactors | 1318 / 52 | 2831 / 112 | 1289 / 51 | 3350 / 132 | 1778 / 70 |
| Other foreign | From homogenous to "colloidal" olefin polymerization catalysts: effects of mass transport limitations on reaction kinetics and polymer microstructure | 692 / 27 | 367 / 14 | 381 / 15 | 351 / 14 | 1540 / 61 |

| | | | | | | |
|----------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| Other foreign | Enhancing water retention in the landscape - implementation of computer-generated design of nature-friendly measures in the process of planning and implementation of Living Landscapes | 0 / 0 | 0 / 0 | 0 / 0 | 606 / 24 | 1237 / 49 |
| Other foreign | | 2009 / 79 | 3198 / 126 | 1670 / 66 | 4307 / 170 | 4555 / 180 |
| TACR | Nanofibrous wound dressings with encapsulated bacteriophages for treatment of infected wounds. | 0 / 0 | 0 / 0 | 2188 / 86 | 2188 / 86 | 0 / 0 |
| TACR | Center for Development of Original Drugs | 1850 / 73 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Advanced Membranes for biogas upgrading and high added value compounds recovery | 656 / 26 | 875 / 35 | 875 / 35 | 219 / 9 | 0 / 0 |
| TACR | Research and development of advanced flow energy storage technologies | 1261 / 50 | 3019 / 119 | 3019 / 119 | 3019 / 119 | 3019 / 119 |
| TACR | METAMORPH - Advanced hybrid organic-inorganic nanofibers for CO2 capture and photocatalysis | 0 / 0 | 0 / 0 | 4547 / 179 | 5170 / 204 | 0 / 0 |
| TACR | Development of processes for the solidification of high level radioactive wastes after NPP sever accident and evaluation of their disposal in radioactive waste repository | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 463 / 18 |
| TACR | National Centre of Competence - Polymer Materials and Technologies for the 21st Century | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 6500 / 256 |
| TACR | | 3768 / 149 | 3894 / 154 | 10628 / 419 | 10596 / 418 | 9982 / 394 |
| TOTAL | | 29023 / 1145 | 25822 / 1019 | 33357 / 1316 | 29850 / 1177 | 27796 / 1096 |

Table 3.3.2 - Contract research activities

| Client ²⁵ | Activity name | Revenue (in thousands CZK/EUR) | | | | |
|-----------------------|---|--------------------------------|-----------|-----------|----------|----------|
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| BENZ- HMB CZECH A.S | Development of control and communication software | 150 / 6 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| BUCHI LABORTECHNIK | Carrying out the implementation | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 921 / 36 |
| CENTRUM VYZKUMU REZ | Determination of corrosion layer | 9 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 170 / 7 |
| CORNING SAS- CETC | Pore-scale simulation | 0 / 0 | 1759 / 69 | 0 / 0 | 0 / 0 | 0 / 0 |
| E&H SERVICES, A.S. | Testing of bioactive substances | 390 / 15 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| EREMA ENGINEERING RE | Pressure decay apparatus for diffusion | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 118 / 5 |
| ESSENCE LINE,S.R.O. | Analysis of polymetase activity | 380 / 15 | 48 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| EVONIK OPERATIONS GM | AFM mapping of high-impact PP | 0 / 0 | 0 / 0 | 0 / 0 | 315 / 12 | 0 / 0 |
| EVONIK RESOURCE EFFI | AFM mapping of high-impact PP | 61 / 2 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| FYZIKALNI USTAV AV CR | Chemical background measurement | 117 / 5 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GARRETT MOTION CZECH | Determination of state of battery | 0 / 0 | 0 / 0 | 0 / 0 | 430 / 17 | 0 / 0 |
| HEALTHYLONGEVITY.SER | Feasibility study stage | 0 / 0 | 0 / 0 | 0 / 0 | 100 / 4 | 0 / 0 |
| HEAVEN LABS S.R.O. | Laboratory analysis of plant samples | 0 / 0 | 0 / 0 | 0 / 0 | 68 / 3 | 48 / 2 |
| INEOS STYROLUTION AM | Consult PB Latex Processes Model | 0 / 0 | 0 / 0 | 813 / 32 | 0 / 0 | 0 / 0 |
| INEOS STYROLUTION GR | Modelling of PB Latex Processes | 767 / 30 | 0 / 0 | 76 / 3 | 584 / 23 | 0 / 0 |
| JOHANNES KEPLER UNIV | Pressure decay apparatus for diffusion | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 118 / 5 |
| JSP INTERNATIONAL | Air diffusion measurement | 40 / 2 | 0 / 0 | 0 / 0 | 0 / 0 | 18 / 1 |
| LEVARE S.R.O. | Spray drying & analytical characteristics | 0 / 0 | 0 / 0 | 0 / 0 | 28 / 1 | 57 / 2 |
| LOVOCHEMIE, A.S. | Preparation of an expert opinion | 125 / 5 | 0 / 0 | 177 / 7 | 499 / 20 | 0 / 0 |
| LUCEBNI ZAVODY DRASL | Semiconductor sensor tests | 121 / 5 | 40 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| MERCEDES-BENZ AG | Extensions of particulate filter | 1358 / 54 | 1472 / 58 | 1101 / 43 | 0 / 0 | 0 / 0 |
| NATIONAL UNIVERSITY | Performing permeation and sorption experiments | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 65 / 3 |
| NOVAVAX CZ A.S. | Two-phase bioreactor simulations | 0 / 0 | 0 / 0 | 0 / 0 | 330 / 13 | 0 / 0 |
| OCTAPHARMA BIOPHARMA | Characterization of the fluid flow | 0 / 0 | 396 / 16 | 0 / 0 | 365 / 14 | 0 / 0 |
| PRO.MED.CS PRAHA A.S. | Particle size measurement | 0 / 0 | 0 / 0 | 0 / 0 | 95 / 4 | 0 / 0 |

²⁵ If the client is from abroad, indicate in brackets the country of origin of the client.

| Client ²⁵ | Activity name | Revenue (in thousands CZK/EUR) | | | | |
|---|---|--------------------------------|------------|------------|------------|------------|
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| SABIC | Equilibrium sorption measurements | 0 / 0 | 0 / 0 | 532 / 21 | 0 / 0 | 3041 / 120 |
| SKODA AUTO A.S. | Development of a simulation model | 0 / 0 | 40 / 2 | 247 / 10 | 245 / 10 | 260 / 10 |
| SPOLANA S.R.O. | Calculation of the temperature in the reactor | 0 / 0 | 0 / 0 | 629 / 25 | 472 / 19 | 477 / 19 |
| STOVICEK: STOVICEK, | Chemical analysis of the sample | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 115 / 5 |
| SU JADERNE OCHRANY | Measurement of vapor adsorption of model substances | 30 / 1 | 50 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| SYNTHOMER A.S. | Creating the stack geometry | 103 / 4 | 262 / 10 | 0 / 0 | 0 / 0 | 0 / 0 |
| TEVA CZECH INDUSTRIE QC TAPI | Morphological and rheological analysis | 0 / 0 | 0 / 0 | 157 / 6 | 0 / 0 | 0 / 0 |
| THE MEMBERS OF SILIC | Chemical analysis | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 277 / 11 |
| UJV REZ, A. S. | Analysis of corrosion products | 28 / 1 | 9 / 0 | 0 / 0 | 0 / 0 | 50 / 2 |
| UNIVERSITY OF APPLIE | Shear stress measurement | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 91 / 4 |
| UNIVERSITY OF NATURA | Characterization of the fluid flow | 0 / 0 | 0 / 0 | 320 / 13 | 0 / 0 | 0 / 0 |
| UNIVERZITA KARLOVA 1. lékařská fakulta | HRMS measurement of the reaction mixture | 0 / 0 | 56 / 2 | 95 / 4 | 0 / 0 | 0 / 0 |
| VALEO AUTOKLIMATIZACE | Infrared spectrum measurement | 44 / 2 | 10 / 0 | 1 / 0 | 1 / 0 | 5 / 0 |
| VU MLEKARENSKY | Determination of selenium and its species | 54 / 2 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| ZENTIVA, K.S. | Analysis of the chemical composition of samples | 909 / 36 | 83 / 3 | 0 / 0 | 544 / 21 | 540 / 21 |
| Sum of others (< 50 000 Kč / 1972 EUR in total) | Different types of analyses | 102 / 4 | 102 / 4 | 81 / 3 | 153 / 6 | 99 / 4 |
| Total | | 4789 / 189 | 4327 / 171 | 4230 / 167 | 4229 / 167 | 6468 / 255 |

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁶, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

The following section presents a selection of the 10 most important research results (as listed in Table 3.4.1) that have been applied or are realistically on the way to being applied, and have the potential to positively impact human society and contribute to sustainability. The gender dimension is implicitly considered in all the results presented below, as these are scientific results that will ultimately have a positive impact on all parts of the human population without discrimination against any of the genders.

1) Patent: Sensor substrate for detecting gaseous substances; Author: Prof. Vrnata; 2020; Link to project: Ministry of Industry and Trade – Chemiresistors Based on Nanocomposite Layers for Gas Detection

A combination of materials and substrate topology has been developed that simplifies the industrial production of chemoresistors and at the same time improves their functional properties (lower operating temperature, lower energy consumption, higher sensitivity, increased selectivity of the sensor when measuring the response with an alternating signal). In addition, a simpler production process means a lower price of the sensor. The social benefit of the invention lies in supporting the production of Tesla Blatná, a.s., currently the only domestic manufacturer of chemoresistors for detecting gases. Supporting local manufacturers helps to reduce the Czech Republic's dependence on the uncertain supply of sensors from their main production area - Southeast Asia. As developments in recent years have confirmed, it will be strategically important for EU countries to return at least some of the production of high value-added electronic components to their territory. The resulting sensors can be used as a modular part of measuring stations for monitoring air quality, alarms for early warning of toxic gas leaks in chemical plants, and also as part of the equipment of integrated rescue system components. From a more general perspective, this is a contribution to the protection of the health and safety of the population. The usefulness of the invention and its commercial success is demonstrated by the fact that sensors on these substrates have become part of the product range of Tesla Blatná and are used in measuring modules for monitoring air quality in cities. The supply of sensors for detection of selected toxic gases used in industry is being prepared for the components of the integrated rescue system.

²⁶ See Terms definition.

2) Patent: Method of production of a composite of yeast-derived beta glucan particle with incorporated poorly-water-soluble low-molecular-weight compound, pharmaceutical preparation and use thereof; Author: Prof. Štěpánek; 2020; Link to project: Ministry of Health – Natural bioactive compounds encapsulated in glucan microparticles as biomaterials suitable in the treatment of inflammatory bowel diseases

This patent describes an original method for the preparation of composite microparticles by spray drying and their use as carriers for poorly soluble drugs. Beta-glucan particles are porous polysaccharide shells prepared from common yeast by washing out all soluble components of the cell wall and internal organelles. Due to their composition, they are immunoactive and therefore actively recognised by macrophages in the human gastrointestinal tract, from where they are transported into the lymphatic circulation. A series of *in vitro* studies demonstrated the high encapsulation efficiency of beta-glucan particles for a range of bioactive substances. Subsequent *in vivo* studies showed that beta-glucan particles containing anti-inflammatory substances were highly effective in the treatment of acute inflammatory bowel disease and could increase the bioavailability of the anti-cancer drug nilotinib. The latter study was supported by the pharmaceutical company Zentiva, which has included beta-glucan particle-based formulations in its development programme. In addition, another *in vivo* study is currently underway at the Veterinary Research Institute, funded by the pharmaceutical company Cheveki-Krus, this time focusing on increasing the bioavailability of antioxidants. It is estimated that more than 80% of new drugs currently in phase 1-3 clinical trials fall into the category of poorly water-soluble substances and therefore require the use of a suitable carrier to increase bioavailability.

3) Patent: Device and method for preparation of liquid marbles; Author: Prof. Štěpánek; 2021; Link to project: Technology Agency of the Czech Republic – Encapsulator for preparation of liquid marbles

This patent describes a unique technology and equipment for the industrial production of liquid marbles. Liquid marbles are small droplets of liquid coated with a thin layer of non-wetting powder that prevents evaporation and allows the marbles to be manipulated as if they were solids, although they contain more than 90% by weight of liquid phase. Liquid marbles were first described in 2001 and have since found a wide range of technical applications, particularly in the food, cosmetics and pharmaceutical industries. However, until now there has been no method for their reproducible and scalable industrial production. This patent is the first in the world to describe such a technology. The patented technology enables the production of liquid marbles on both a laboratory and industrial scale and can be used with aqueous solutions as well as oils or melts. The potential application in pharmaceutical production was demonstrated in collaboration with the pharmaceutical company Zentiva using the example of the drug Abiraterone acetate, which is used in the first-line treatment of prostate cancer and has annual sales of around USD 2.5 billion. However, due to low bioavailability, the formulation currently on the market requires patients to swallow 4x250 mg tablets, which is problematic for many patients, especially the elderly. The liquid marbles technology has made it possible to more than double the bioavailability of this drug and eliminate the so-called food effect, i.e. the dependence of the amount absorbed on whether the drug is taken on an empty stomach or with food. This will allow patients around the world to take lower doses, improving convenience and reducing unwanted side effects.

4) Patent: Method of applying layers on sensor platforms for detecting gas; Author: Prof. Vršata; 2021; Link to project: Ministry of Industry and Trade – Chemiresistors Based on Nanocomposite Layers for Gas Detection

The essence of the patented solution is the use of plasma polymerisation based on sputtering from a solid target. This process creates a polymer by using high-energy plasma ions to activate monomer molecules. The resulting polymer has a unique structure that improves mechanical and chemical properties such as resistance to ageing and shrinkage. This process uses RF discharge to form the polymer and the addition of aldehydes maintains the concentration of carbonyl groups in the final polymer. During the process, the surface is irradiated with a laser, which improves the adhesion of the layer to the substrate. The advantage of this method is that the sensors have better detection properties due to an increased number of gas binding sites and better charge transfer to the electrodes. The process allows quick and flexible adjustments during production, which is efficient and economical. Sensors produced by this method outperform those produced by traditional techniques and remain stable over time. The method is ideal for forming thin layers from 10 to 5000 nm and for producing long-term stable gas sensors. In addition, the use of this method will enable faster and more efficient production of sensors. The patent was developed in cooperation with Tesla Blatná, a.s. The innovative technology introduced by the patent allows for increased production capacity and improved detection properties of sensors compared to conventional methods. The invention is expected to be used in a wide range of industries, from analytical chemistry to environmental protection, opening new markets and opportunities for Tesla Blatná to collaborate with other industrial partners.

5) Patent: Device for continuous spray drying with variable inlet composition, method for continuous production of multi-component powders by spray drying and use thereof; Author: Prof. Štěpánek; 2023; Link to project: Technology Agency of the Czech Republic – Sprejobot - a robot for speeding-up drug formulation

Pharmaceutical drug development relies heavily on the creation of amorphous solid dispersions (ASDs) to improve the dissolution rate and stability of active pharmaceutical ingredients (APIs). Developing ASDs with the desired physicochemical properties is a complex and time-consuming process that often involves the manual preparation of numerous sample compositions with varying ratios of API and excipients. This tedious and resource-intensive task has hindered systematic exploration of the formulation design space, resulting in suboptimal formulations and slower drug development processes. The research team led by prof. František Štěpánek at the Department of Chemical Engineering, UCT Prague, has addressed this challenge by introducing the "spray drying robot", an innovative device that streamlines the preparation of ASDs. The Spray Drying Robot allows researchers to produce powder samples with systematically varying compositions during a single spray drying run, dramatically reducing the time and manual effort required for formulation development. The significance of this technology lies in its potential to accelerate the drug development process. By automating the creation of multi-component powder samples, the spray drying robot provides a practical solution for large-scale screening studies, allowing researchers to explore the formulation design space more efficiently and systematically. This time-saving innovation will make a significant contribution to the development of better and more effective medicines.

6) Spin-off: MarbleMat; Founder (CEO): Dr. Rychecký; 2021; Link to project: Technology Agency of the Czech Republic – Encapsulator for preparation of liquid marbles

The encapsulation of liquid oil droplets (“oil marbles”) technology (see above patent “Device and method for preparation of liquid marbles”), which can be used in pharmaceuticals and in food production, represents one of the first cases of the transfer of UCT Prague research results into a spin-off company. UCT Prague has granted intellectual property rights to a new company, MarbleMat, which commercialises and further develops the liquid marbles technology. MarbleMat s.r.o., founded by Ing. Ondřej Rychecký from UCT Prague’s Department of Chemical Engineering, signed a license agreement and patent transfer agreement with the University in 2022. The technology underpinning MarbleMat’s commercial activity consists in the encapsulation of oil marbles for use in the pharmaceutical and food industries. The device for preparing oil marbles was developed as part of the Technology Agency of the Czech Republic’s Zéta project in cooperation with VUTS in Liberec. During the short period of its existence, MarbleMat has secured funding from the Technology Agency of the Czech Republic for the Gama2 project, and it was ranked among the top 20 startups in the EIT Health InnoStars Award 2022 competition.

7) Spin-off: Lezare; Founder (CEO): Dr. Ruphuy; 2021; Link to project: Ministry of Health – Natural bioactive compounds encapsulated in glucan microparticles as biomaterials suitable in the treatment of inflammatory bowel diseases

The creation of this spin-off is closely related to the technology of formulating poorly soluble drugs in glucan particles developed at the Department of Chemical Engineering, UCT Prague, which was subsequently patented (see above patent "Method of production of a composite of yeast-derived beta glucan particle with incorporated poorly-water-soluble low-molecular-weight compound, pharmaceutical preparation and use thereof"). In addition to the strategy of applying the patent through licensing to existing pharmaceutical companies on the basis of successful *in vivo* studies for specific indications, the originator of the patent, Dr Gabriela Ruphuy from the Department of Chemical Engineering, UCT Prague, founded the spin-off company Lezare s.r.o., which commercialises the technology of formulating poorly soluble drugs into glucan particles in the form of B2B (business-to-business) services, i.e. tailor-made preparation of drug formulation prototypes for companies developing new biologically active substances. The quality and originality of the glucan particle technology, including the business plan of Lezare s.r.o., were recognised by the fact that this spin-off company made it through national and regional rounds to the pan-European final of the EIT JumpStarter 2021 competition and was selected in the Health segment as one of the 6 most innovative start-ups in Europe in 2021.

8) Software: Extensions of particulate filter model; Author: Prof. Kočí; 2019; Link to project: Czech Science Foundation – Microstructure of catalytic filters for automotive exhaust gas aftertreatment

The developed software simulates the performance of a catalytic filter for exhaust gas after treatment in real time, depending on the device configuration and operating conditions. The advanced physical and chemical model enables accurate prediction of conversions for gaseous pollutants (CO, hydrocarbons and NO_x) as well as filtration efficiency for particulate matter (soot and ash). The model equations are solved by an efficient numerical solver developed in house

and the employed reaction kinetics and soot capture models reach higher level of detail compared to commonly available models. The robustness and versatility of the software and reliability of the results allows its application in the automotive industry (Mercedes-Benz AG), where it is used for optimization and tailoring of the device configuration for specific engines as well as identification of control strategies that lead to minimum emissions of air pollutants.

9) Functional sample: MF+PV Membrane module; Author: Prof. Moucha; 2019; Result of collaboration with an industrial partner (MemBrain, s.r.o.)

In the search for alternative energy sources, biotechnological processes for the production of energy-rich compounds are becoming increasingly important. One of the typical biotechnological processes used for this purpose is ABE fermentation, where the primary product is a mixture of acetone-butanol-ethanol. Concentration of this product by removal of the aqueous component, which is necessary during the fermentation process itself (ensuring the necessary living conditions for the biomass), is an integral part of the technology leading to the acquisition of a usable energy-rich product. The functional sample of two-stage separation (microfiltration separating biomass followed by pervaporation producing a concentrated ABE mixture) shows the way to obtain an energy-rich, valuable product. The expected benefit of introducing two-stage separation into biotechnologies is to increase their efficiency through continuous operation, i.e. by multiplying the duration of individual campaigns, which is estimated to bring i) an increase in the time fund for production by 20% and ii) financial savings associated with reducing the number of technology start-ups and shutdowns by 60% of current costs. The intensification of biotechnology in the field of alternative fuel production is globally welcomed.

10) Utility model: Equipment for sampling from a packed distillation column; Author: Assoc. Prof. Rejl; 2020

This utility model describes a device for taking liquid and vapour samples from the packed bed of a distillation column. Sampling directly from the bed is not common, usually only the phases above and below the bed are sampled. When sampling directly from the bed, bayonet sampling is used - metal tubes with cut-outs that reach to the centre of the bed, or various troughs and covered needles. In none of these cases can the sample be accurately assigned to the location from which it was taken, the liquid and vapour phase samples may be mixed, and to some extent the packing and hydrodynamics of the phases flowing through the bed are disturbed. The sampling device is designed to collect liquid and vapour phase samples from three points along the column cross section and can be used in a packed bed consisting of both loose and structured packing. This type of sampler provides a detailed compositional field in the packed bed of the column. This allows 1) to detect possible errors in the bed assembly or in the initial distribution of the phases; 2) to check the radial homogeneity of the phase composition on a section of the bed; 3) to calculate the values of the volumetric mass transfer coefficients; 4) to quantify the degree of longitudinal mixing of the liquid phase. This data can then be used to optimise the operation of distillation columns and thus increase the overall efficiency of this type of production process, including reduction of energy consumption.

Table 3.4.1 - Overview of research results in the period under evaluation

| Type of result ²⁷ | Year of application | Name |
|------------------------------|---------------------|--|
| Patent | 2020 | Sensor substrate for detecting gaseous substances |
| Patent | 2020 | Method of production of a composite of yeast-derived beta glucan particle with incorporated poorly-water-soluble low-molecular-weight compound, pharmaceutical preparation and use thereof |
| Patent | 2021 | Device and method for preparation of liquid marbles |
| Patent | 2021 | Method of applying layers on sensor platforms for detecting gas |
| Patent | 2023 | Device for continuous spray drying with variable inlet composition, method for continuous production of multi-component powders by spray drying and use thereof |
| Spin-off | 2021 | MarbleMat |
| Spin-off | 2021 | Levare |
| Software | 2019 | Extensions of particulate filter model |
| Functional sample | 2019 | MF+PV Membrane module |
| Utility model | 2020 | Equipment for sampling from a packed distillation column |

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

²⁷ Specify the specific type of result. Add rows as needed.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)²⁸, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).²⁹

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

The Rector's Office for Research and Technology Transfer (R&TTO) is centrally established at UCT Prague and provides support in the field of intellectual property protection, commercialization and transfer of the results generated at UCT Prague. In this area, the R&TTO cooperates with the vice-deans of individual faculties and individual heads of research groups. An important part of the commercialization is carried out in the form of obtaining contracts from industrial partners on the basis of know-how and results generated at the faculty. A prime example of this approach is the model of the performance of a catalytic filter for exhaust gas aftertreatment, which was developed on the basis of fundamental research and then commercially applied in the form of software sold to a major global car manufacturer (Mercedes-Benz AG), see example no. 1 below. Other methods used for the transfer of research results into practice include national or international patents (examples no. 2 and 4 below) and, more recently, spin-off companies founded by faculty members (examples no. 3 and 5 below).

1) Software: Extensions of particulate filter model; Author: Prof. Kočí; 2019

The developed software was described in detail in section 3.4 (item no. 8). The basis of this commercially successful software is a complex mathematical model of a catalytic filter for exhaust gas aftertreatment, which is the result of a fundamental research project focused on the study of the microstructure of catalytic filters. Prof. Kočí's research group at the Department of Chemical Engineering, UCT Prague has been working on this topic for a long time and, thanks to its excellent scientific results, has been able to establish cooperation with a leading global car manufacturer. This software is one of a number of applied results that Mercedes-Benz AG has purchased from Prof. Kočí's group.

²⁸ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

²⁹ If the commercialisation of R&D&I results is carried out in this way.

2) Patent: Method of production of a composite of yeast-derived beta glucan particle with incorporated poorly-water-soluble low-molecular-weight compound, pharmaceutical preparation and use thereof; Author: Prof. Štěpánek; 2020

Technical details of this patented technology can be found in section 3.4 (item no. 2). Due to the promising results of *in vivo* studies and the interest of pharmaceutical companies in the application of the patented technology, the Commercialisation Council of UCT Prague decided to extend the territorial scope of the original CZ patent, resulting in a family of derivative patent applications (PCT, EU, USA, Canada). These patents are now gradually entering the national phase and are the basis for maximising the future commercial exploitation of the original invention. It is estimated that more than 80% of new drugs currently in phase 1-3 clinical trials fall into the category of poorly water-soluble substances and therefore require the use of a suitable carrier to increase bioavailability. Even if glucan particle technology were to be applied to only 1% of newly developed molecules in clinical development, this would represent a share of future sales of pharmaceutical products with a global impact in the order of hundreds of millions to billions of dollars.

3) Spin-off: Levare; Founder (CEO): Dr. Ruphuy; 2021

In addition to the strategy of applying the above-mentioned patent through licences granted to existing pharmaceutical companies based on successful *in vivo* studies for specific indications (see example no. 2 above), the co-originator of the patent, Dr. Gabriela Ruphuy from the Department of Chemical Engineering, UCT Prague, also founded the spin-off company Levare s.r.o., which commercializes the technology of formulating poorly soluble drugs into glucan particles in the form of B2B (business-to-business) services, i.e. custom-made preparation of drug formulation prototypes for companies developing new biologically active substances. For the Levare spin-off, see also section 3.4 (item no. 10).

4) Patent: Device and method for preparation of liquid marbles; Author: Prof. Štěpánek; 2021 & 5) Spin-off: MarbleMat; Founder (CEO): Dr. Rychecký; 2021

Technical details of this patented technology and the related spin-off company can be found in section 3.4 (items 3 and 9). In view of the uniqueness and high international application potential, a PCT application for a derived international patent was also filed after the Czech national patent was granted. The application potential in the field of pharmaceutical production was successfully demonstrated in cooperation with the pharmaceutical company Zentiva using the example of the drug Abiraterone acetate, which is used to treat prostate cancer. As a result of this success, a spin-off company, MarbleMat, s.r.o., was founded to commercialise and further develop the liquid marbles technology. The patented technology has already been commercialised and UCT Prague has entered into an exclusive licensing agreement with MarbleMat, which includes both an upfront payment and a royalty on future sales. MarbleMat's business plan includes international expansion and the use of the liquid marbles production technology for pharmaceutical products with total annual sales in excess of USD 10 billion. As part of the pan-European EIT Health InnoStars 2022 competition, MarbleMat's business plans were analysed in detail by international experts and the method of producing liquid marbles using the patented technology was selected as one of the top 20 best start-ups in Europe. This fact, together with the willingness of investors to pay a significant upfront fee for an exclusive licence and shares in future sales, indicates the likely size of the real potential for application on the global market.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

| Type of revenue | Revenue (in thousands CZK/EUR) | | | | |
|---|--------------------------------|---------------------|---------------------|----------------------|-----------------------|
| | 2019 | 2020 | 2021 | 2022 | 2023 |
| MarbleMat s.r.o - licence fee | 0/0 | 0/0 | 0/0 | 350 / 14 | 0/0 |
| Eaton Elektrotechnika – licence fee | 0/0 | 0/0 | 0/0 | 147 / 6 | 178 / 7 |
| Büchi Labortechnik AG – milestone fee | 0/0 | 0/0 | 0/0 | 0/0 | 2320 / 92 |
| Donations to support research and student research activities | 715 / 28 | 490 / 19 | 595 / 24 | 814 / 32 | 1 000 / 40 |
| Total | 715 / 28 | 490 / 19 | 595 / 24 | 1311 / 52 | 3498 / 139 |

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment: FCE staff and students regularly take part in university-wide popularisation activities: Summer School, Science Festival, Youth Academy, European Science Night. In addition, regular activities are organised to encourage our students' interest in R&D&I: Student Scientific Conferences, where students present their projects to industry. The best projects are rewarded by both industry and scientific organisations. The UCT Communications Department supports scientists' appearances in traditional media and social networks. The following table lists the top 10 activities in which FCE is involved:

1) Summer school for high school teachers and high school students (2019 – 2023)

The Chemistry for Life Summer School is organised annually by the University of Chemistry and Technology in Prague for high school chemistry teachers and their students. Over the course of three days, 12-15 professional lectures are presented from various fields of chemistry and physics (FCE covered the fields of chemical engineering, computational chemistry, applied physics, chemical cybernetics). Participants visited the laboratories of the University of Chemistry and Technology, where they were able to try out simple experiments that can then be prepared for students in their high schools. The number of participants was usually between 110-130 teachers and 120-140 students.

2) CARBONCAST (2021 – 2023)

CarbonCast is the official university podcast of the UCT Prague, featuring interviews with distinguished individuals affiliated with the institution. The podcast explores topics ranging from science and research to university life and experiences beyond academia. Guests include academics, staff, students, and accomplished alumni.

More details: <https://creators.spotify.com/pod/show/carboncast0>

3) ScienceFest (2019 – 2023)

VědaFest (ScienceFest) is the largest open-air science outreach event in Czechia, held annually in the Dejvice campus. The festival provides visitors with the opportunity to engage with the latest scientific discoveries through interactive exhibitions, hands-on experiments, and expert lectures. FCE participates in this event every year with a presentation stand, popularising a selected scientific research topic from the faculty's areas of interest.

4) Open Days at UCT Prague (2019 – 2023)

Open Days at UCT Prague are unique events designed for prospective students to gain a detailed insight into the study programmes at our university. Prospective students can explore the university's facilities and laboratories, where an interactive and educational programme is prepared, and meet academic staff and current students. FCE is one of the main co-organisers of this major public relations event, showcasing its courses through presentations, themed stands and tours of selected FCE laboratories. In addition, FCE actively participates in the Open University programme, where prospective students can experience life at UCT by accompanying a current student. This includes visiting the campus, attending lectures and observing laboratory work.

5) Youth Academy (UCT Prague +DDM Prague) (2019 – 2023)

Organization of popularization lectures for secondary school students, 2019 - 2023 Lecturers from all over VŠCHT with a focus on lecturers who can captivate talented but still lay listeners with their speech.

6) The Curious - audiovisual profiles (in the original "Zvědaví - audiovizuální profily") (2022-2023)

The #Zvědaví project showcases a group of 19 young individuals who have embarked on their scientific and technological journeys at UCT Prague. Through a series of audiovisual portraits, it documents their unique life paths driven by a desire to understand the world through the natural sciences. Five students and alumni from FCE take part in the project.

7) Student Scientific Conference (SVK, 2019–2023)

Every autumn, FCE organises the Student Scientific Conference (SVK), where bachelor and master students present the results of their research. The conference is divided into several thematic sections, and each student participant presents his or her work in the form of a short lecture to a committee of experts. At FCE, all sections of the conference are also open to students from other Czech and Slovak universities. It has become a tradition that, in addition to the evaluation of the

contributions by committees composed of lecturers from UCT Prague, the students' projects are evaluated and awarded by representatives of the industry. The day of the competition also includes an introduction of the members of the evaluation committee and a presentation of the sponsoring company, which can thus approach the students for future cooperation. A major benefit of this event is the coordination of interests and cooperation between academia and industry.

8) University of the 3rd Age (U3V, 2019 –2023)

The University of the Third Age (U3V) is one of the forms of lifelong learning that UCT Prague implements as a member of the Association of Universities of the Third Age. The aim of the courses is to provide seniors with the opportunity to systematically familiarize themselves with the latest knowledge in the areas taught at UCT Prague in a qualified manner and at a university level. The organization of U3V courses is the basis for the continuous mental development of citizens of post-productive age, who not only expand their knowledge, but above all stimulate their interest in current events, the practical use of acquired knowledge and a constant active approach to life. As part of this programme, FCE offers a two-year course called Living with a Computer. The aim of the course is to provide a basic level of knowledge and skills in the use of computers in everyday life, particularly for older people. The programme is practical and emphasises mastery of computer work to a level that will enable graduates to develop their knowledge and skills independently.

9) Celebrating the centenary of the word "robot" (2021)

In 2021, scientists from FCE dealing with the topic of artificial life, led by Assoc. Prof. Jitka Čejková from the Department of Chemical Engineering, were the initiators and organizers of the celebration of the 100th anniversary of the premiere of Karel Čapek's famous play R.U.R. (Rossum's Universal Robots), and therefore of the globally used word "robot", which first appeared in this work. As part of the celebrations, the ALIFE 2021 conference on artificial life was held in Prague and the Czech-language book Robot 100 was published, followed by the English-language book RUR & The Vision of Artificial Life (MIT Press).

More details: <https://www.robot100.cz/>

10) Nobel Lectures (2019–2023)

Dr. Pavel Galář from the Department of Physics and Measurements is the founder and co-organiser of the annual pre-Christmas Nobel Lectures, where leading Czech scientists talk about the latest Nobel Prizes in Physics and Chemistry. These popular science lectures introduce individual laureates, explain the main ideas of the discoveries and their significance not only for the scientific world. The event is aimed not only at the academic community of UCT Prague, but also at the general public. The Nobel Lectures have become very popular and well attended in recent years.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

**Although efforts have been made in structuring PhD studies since the launch of newly accredited PhD programs in 2020, a doctoral school implemented at the UCT Level, with staff from FCE and outside FCE and UCT, would reinforce the monitoring of the progress of PhD students, would help them to organize their work in agreement with their supervisors and would improve the efficiency and completion rates of PhD projects.*

The doctoral school has undergone favorable development at the UCT and FCE levels. The FCE fully manages the administrative agenda related to the admission process, scholarships, periodic evaluation of doctoral students, state examinations, and dissertation defenses. The FCE has hired a new study officer responsible for integrating international students into the academic environment at the FCE.

At the UCT level, educational lectures have been prepared for those interested in doctoral studies and new PhD students. A so-called "Survival Guide" has been created as a navigational tool for PhD students, along with a PhD Newsletter, mentoring programs, and other activities.

Numerous workshops and training sessions are organized at the UCT level on topics such as scientific data management, academic writing, ethics, and soft skills. FCE academic staff have provided training for the entire UCT community focused on ethical behavior in science and research, as well as data stewardship.

FCE strongly supports the international dimension of doctoral studies. Students can choose from several double-degree study programs. FCE financially supports long-term (3+ months) research stays for PhD students at foreign universities and industrial enterprises engaged in R&D activities. Many current FCE doctoral students are involved in The Parc (Pharmaceutical and Applied Research Center, theparc.eu), an initiative focused on transferring new findings into the pharmaceutical industry.

** An effective sabbatical policy and various incentives should be introduced to encourage researchers at all stages of their career development to engage in industrial consultancies, commercialization of their research and in activities that increase their international recognition.*

Academic staff is entitled to paid sabbatical every seven years. FCE supports those interested in taking a sabbatical not only financially but also organizationally by facilitating the transfer of their teaching responsibilities to other academic staff. During the observed period, our employees spent their sabbatical at Rutgers University, NJ, and the University of California, LA.

** The team under the supervision of the vice-dean of education and dedicated to coordination of teaching activities could be strengthened at FCE in order to better organize studies in agreement with the other faculties. Indeed, sharing teaching of basic modules between faculties could be possible, in order to decrease the teaching duties for FCE particularly at the BSc level, while maintaining a common educational programme (and level) for all BSc students in UCT. Lecturer positions could be opened (to be discussed at the UCT level and with the other faculties) for disciplines which are not the research core of UCT and FCE.*

Other faculties outside FCE do not have teachers qualified in the fields of mathematics or physics, so it was not within the FCE capacity to fully implement this recommendation. The issue is not that the FCE provides teaching in mathematics, physics, and other subjects for the entire UCT, but rather that the distribution of teaching workload across semesters is highly unbalanced for FCE departments.

There are two persistent reasons for this situation: 1) The practical absence of an admission process at UCT level, leading to a significantly higher teaching load in the winter semester, 2) A rigid structure of the UCT common study foundation, which once again concentrates the majority of the teaching responsibilities of FCE in the winter semester. Hopefully, the second reason will be eliminated due to the revised study programs. However, potential progress depends on the ability of other faculties to recognize and help address this issue.

FCE has long advocated for the introduction of lecturer positions. This was successfully implemented at UCT starting in 2025, when the first lecturers were hired at the Department of Mathematics, Informatics, and Cybernetics.

**Departments could therefore concentrate more efficiently on research activities instead of teaching organization. Indeed, departments have uneven size and reorganization of the departments could be considered and carried out around research, by finding synergies between groups and activities, including synergies with other faculties. The specificity of the reorganized departments could be highlighted taking into account the diversity of the research. This could increase the critical mass of human resources and effective sharing of resources and instruments between researchers.*

Following the recommendation, we proceeded with the merger of the Department of Mathematics and the Department of Computer and Control Engineering, resulting in the establishment of the new Department of Mathematics, Informatics, and Cybernetics. The new department, with its personnel capacity, is better prepared to handle the uneven distribution of teaching workload across semesters. The merger has also facilitated the intensive integration of former Department of Mathematics staff into research activities and has partially reduced the bureaucratic burden.

R&D activities at FCE are highly diversified, with intensive collaboration taking place among various FCE departments on joint research projects. Cooperation extends to departments of other faculties and institutions at both national and international levels. The sharing of instrumentation and equipment within FCE is at an excellent level.

**An incubator which could raise funds could be implemented at the UCT level, in order to efficiently allow the founding of start-up companies. Supportive incentives in terms of workload and in-kind support could be implemented at the FCE level to strengthen the initiative.*

The activities of the Research and Technology Transfer Office at UCT significantly improved, enabling our PhD students and academic staff to file patent applications, commercialize R&D results, and establish start-ups. PhD students and early-career academics from FCE performed excellent in securing public funding from the Zéta Program of the Technology Agency of the Czech Republic. The co-financing of projects was covered by FCE and UCT funds. FCE also provided access to existing infrastructure and administrative support for the needs of ongoing projects. FCE will continue to offer this support in the future.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

| Document name | No. criteria | Location (link in HTML) |
|---|--------------|---|
| Celebrating the centenary of the word "robot" | 3.6 | https://www.robot100.cz/ |
| Spotify Carboncast | 3.6 | https://creators.spotify.com/pod/show/carboncast0 |
| | | |
| | | |

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Food and Biochemical Technology (FFBT)

FORD: 1 - Natural sciences

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Mission and vision of evaluated unit, long term goals:

FFBT is a research-oriented faculty providing excellent engineering education in the field of **1)** biochemistry and bioorganic chemistry, **2)** microbiology, **3)** biotechnology, **4)** food chemistry and technology, **5)** food analysis and nutrition, and **6)** pharmaceutical biotechnology at the bachelor, master and doctoral levels. Within MSc and doctoral studies, these are accredited studying programs of which Biochemistry and Bioorganic Chemistry along with Biotechnology are accredited double-degree programs either with Ecole nationale superieure de chimie de Rennes and the Arctic university of Norway, Tromsø or Slovak University of Technology in Bratislava as international partners. In addition, FFBT provides teaching of fundamental subjects such as Biochemistry I, II and Laboratory of biochemistry across the whole institution.

The mission of FFBT is to conduct cutting-edge research at the boundaries of **1-Natural Sciences** and **2-Engineering and Technology** in accordance with R&D&I capacities presented in Table 3.1.6. During the evaluation period, FFBT became a highly respected authority in the Czech Republic and abroad via its large infrastructure projects (METROFOOD-CZ, ELIXIR-CZ, EATRIS-CZ), centres of excellence (National Institute of Virology and Bacteriology, Pharmacrine, New synthetic drugs), national centres of competence (Biorefinery Research Centre of Competence, BIORAF; Biorefining as circulation technology, BIOCIRTECH; BIOCIRKL), EU projects (FOODSAFETY4EU, EU-CHINA-SAFE), prestigious D1 and Q1 publications and successful transfer of achieved results into the practice.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

To realize the above-mentioned mission, the faculty must stand firmly on two legs: **a)** qualified human resources, i.e. top-level academics, and **b)** finances necessary for teaching and R&D&I activities. To fulfil the mission, motivation and massive support of young academics from the group of Early Career Researchers (14 % increase in the 2019-2023 reporting period), Assistant Professors, Post-Docs, as well as those returning from abroad or after maternity and/or parental leave are especially important. Young workers need to know that the UCT and the FFBT are reliable employers to whom they can trust. Finance for teaching and R&D&I activities in 2019-2023 was successfully secured through institutional funding, from 131 research projects in the role of the main beneficiary (271,396 thousand CZK/8,592 thousand EUR in Table 3.3.1) and another participant (361,279 thousand CZK/14,252 thousand EUR in Table 3.3.1), contract research activities (151,210 thousand CZK/5,965 thousand EUR Table 3.3.2) or revenues from non-public sources (Table 3.5.1). Academic or intellectual inbreeding is still a relatively widespread problem at FFBT, but our long-term goal is to significantly reduce it. One of the corrective measures is the compulsory long-term international experience without which it is not possible to defend a Ph.D.. FFBT proactively supports MSCA FELLOWSHIPS, mobility of both staff outgoing and incoming international experts (Tables 3.2.2 and 3.2.3), post docs.

FFBT self-reflection of the societal contribution of R&D&I:

The basic and applied research reflects societal highly relevant areas such as **1)** strengthening of human health, **2)** COVID-19 monitoring and anti-pandemic measures, **3)** preparation of biologically active substances including antivirals, **4)** environmental biotechnology, **5)** recycling of waste from industrial production, **6)** environmentally sound technologies for the production of renewable energy sources, and **7)** production and increase in the nutritional value of food, including quality control, authenticity and human biomonitoring. The aforementioned societal contribution helps proactively fulfil long-term mission and action plans of the EU and the Czech Republic, such as Climate action and Green Deal, the Circular Czech Republic 2040 action plan, and the RIS3 strategy of the Czech Republic.

The FFBT played a particularly important role during the COVID-19 pandemic; among our employees are leading Czech virologists (e.g. Prof. M. Rumlová). Moreover, one of the most prominent graduates of the faculty is Dr. Tomáš Cihlář, known for the development of Remdesivir and tenofovir disoproxil (Viread). Dr. Cihlář is a well-known specialist in virology, who holds the positions of senior director, biology, and vice-president at American pharmaceutical company Gilead Sciences.

Our latest scientific findings aligned with current societal needs can be found in prestigious scientific journals including Nature Communications, textbooks (section 3.2) and professional literature. International and national conferences are periodically organized for the professional public and industrial partners, while workshops and events promoting FFBT science are held for the general public. Details can be found in the section 3.2 and 3.7. Intensive co-operation of FFBT with industrial partners improves the competitiveness of Czech companies in the field of food and beverages industry, biotechnology, biochemistry and mechanical engineering. Significant outputs of joint cooperation are patents, utility models, functional samples, certified methodologies, verified technologies, pilot plants and prototypes.

The faculty's accredited laboratories provide certified analyses of food and natural substances, food packaging and microbiological evaluation of food and water. Another important activity consists in raising of awareness and informing the general public of the quality of food via the media. The faculty's employees are active in Czech authorities (Federation of Food and Drink Industries of the Czech Republic) and professional associations. The activities of the faculty thus bring a broad scope of society-wide benefits.

FFBT organisational structure and size:

FFBT consists of 7 Departments, the administrative unit of the faculty is the Dean's Office. The basic platform for an effective management of the FFBT and the transfer of important information from the university top management is the Dean's Collegium, consisting of the Dean, Vice-Dean for Education, Vice-Dean for Science and Research, Vice-Dean for External Relations, the FFBT secretary, representative of the academic senate, and heads of FFBT departments. In the course of evaluation period, academic and professional positions slightly decreased in Full-Time Equivalents from 223 to 207. The interest of applicants for bachelor's, master's and doctoral studies also slightly decreased in the evaluation period but it is considered as stable (Tables 3.1.4, 3.1.5). Apparently, the situation with the Covid-19 pandemic and actual demographic situation have had an impact. FFBT has the highest representation of women among the R&D&I personnel within the UCT, yet we notice insufficient representation of women in the position of Full Professor. The situation is significantly better in the group of Associate Professor, Assistant Professor and Early career researchers, therefore it can be expected that gender equilibrium will be achieved in the near future (Tables 3.1.2, 3.1.3).

Table 3.1.1 - Staffing per FTE²

| Academic/ Professional position | Total / Of which women | | | | | |
|--|------------------------|-------------|-------------|-------------|-------------|---------------|
| | 2019 | 2020 | 2021 | 2022 | 2023 | Total |
| Professor | 21,8 / 4,7 | 21,9 / 4,7 | 20,1 / 4,5 | 20,5 / 4,7 | 20,36 / 4,5 | 104,66 / 23,1 |
| Associate Professor | 28,6 / 14,1 | 29,7 / 15,1 | 29,6 / 15,4 | 29,6 / 15 | 30,9 / 15,2 | 148,4 / 74,8 |
| Assistant Professor | 56 / 32,2 | 57,4 / 30,9 | 56,1 / 30,1 | 53,6 / 28,9 | 53,7 / 29,7 | 276,8 / 151,8 |
| Assistant | 2 / 2 | 2 / 2 | 1,9 / 1,9 | 1,6 / 1,6 | 1,6 / 1,6 | 9,1 / 9,1 |
| R&D Personnel ³ | 88 / 53,6 | 75,8 / 46,6 | 69,2 / 41,2 | 70,7 / 42,4 | 74,4 / 48 | 378,1 / 231,8 |
| Researchers in other categories ⁴ | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Technical and economic staff ⁵ | 26,2 / 20,9 | 28 / 22,6 | 26,7 / 22,5 | 26,6 / 22 | 25,8 / 21,7 | 133,3 / 109,7 |
| Scientific, research and development staff involved in teaching activities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Early career researchers ⁶ | 0 / 0 | 33,8 / 15,6 | 33,7 / 15,8 | 30,1 / 15 | 31,1 / 16,3 | 128,7 / 62,7 |

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

| | | | | | | |
|--------------------|---------------|---------------|---------------|---------------|----------------|-----------------|
| Total ⁷ | 222,6 / 127,5 | 214,8 / 121,9 | 203,6 / 115,6 | 202,6 / 114,6 | 206,76 / 120,7 | 1050,36 / 600,3 |
|--------------------|---------------|---------------|---------------|---------------|----------------|-----------------|

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 1 | 0 | 6 | 1 | 12 | 2 | 10 | 3 |
| Associate Professor | 0 | 0 | 6 | 4 | 11 | 6 | 12 | 6 | 5 | 2 | 0 | 0 |
| Assistant Professor | 1 | 1 | 38 | 19 | 24 | 17 | 3 | 3 | 5 | 1 | 0 | 0 |
| Assistant | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| R&D Personnel ⁹ | 72 | 46 | 42 | 24 | 13 | 10 | 3 | 3 | 6 | 0 | 3 | 1 |
| Researchers in other categories ¹⁰ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹¹ | 3 | 3 | 8 | 5 | 13 | 11 | 6 | 5 | 5 | 4 | 2 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹² | 1 | 1 | 36 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹³ | 76 | 50 | 94 | 52 | 62 | 44 | 31 | 19 | 34 | 10 | 15 | 4 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 3 | 1 | 5 | 2 | 9 | 0 | 13 | 5 |
| Associate Professor | 0 | 0 | 3 | 2 | 16 | 10 | 11 | 5 | 7 | 3 | 2 | 1 |
| Assistant Professor | 1 | 1 | 34 | 17 | 22 | 14 | 6 | 6 | 4 | 1 | 0 | 0 |
| Assistant | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 3 | 0 | 0 |
| R&D Personnel ¹⁵ | 69 | 47 | 32 | 16 | 10 | 6 | 6 | 4 | 4 | 1 | 0 | 0 |
| Researchers in other categories ¹⁶ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹⁷ | 0 | 0 | 7 | 5 | 6 | 6 | 12 | 9 | 4 | 4 | 1 | 1 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹⁸ | 2 | 2 | 37 | 21 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹⁹ | 70 | 48 | 76 | 40 | 58 | 38 | 40 | 26 | 31 | 12 | 16 | 7 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students

| Type of study | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Undergraduate | 759 | 585 | 659 | 485 | 584 | 410 | 677 | 481 | 644 | 466 | 1921 | 1407 |
| Master's ²⁰ | 402 | 313 | 412 | 321 | 370 | 290 | 357 | 268 | 317 | 226 | 1068 | 819 |

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

| | | | | | | | | | | | | |
|---------------------------|------|------|------|-----|------|-----|------|-----|------|-----|------|------|
| Doctoral | 235 | 140 | 250 | 150 | 256 | 153 | 238 | 139 | 212 | 116 | 268 | 187 |
| Lifelong Learning Courses | 52 | 44 | 20 | 16 | 149 | 93 | 51 | 37 | 84 | 47 | 356 | 237 |
| Total | 1448 | 1082 | 1341 | 972 | 1359 | 946 | 1323 | 925 | 1257 | 855 | 3613 | 2650 |

Table 3.1.5 - Study programmes in Czech/English

| Type of study programme | Total ²¹ / Of which professional study programmes | | | | | | | | | | | |
|---------------------------|--|---|------|---|------|---|------|----|------|----|-------|----|
| | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
| Undergraduate | 8 | 0 | 8 | 0 | 9 | 0 | 7 | 0 | 6 | 0 | 10 | 0 |
| Master's | 17 | 0 | 19 | 0 | 13 | 0 | 9 | 0 | 10 | 0 | 21 | 0 |
| Doctoral | 48 | 0 | 48 | 0 | 48 | 0 | 36 | 0 | 40 | 0 | 52 | 0 |
| Lifelong Learning courses | 7 | 6 | 7 | 6 | 7 | 6 | 11 | 10 | 13 | 12 | 13 | 12 |
| Total | 80 | 6 | 82 | 6 | 77 | 6 | 63 | 10 | 69 | 12 | 96 | 12 |

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

| R&D&I field | FORD | FORD share [%] | Predominant type of research | Total share of industry group [%] |
|-------------------------------|---|----------------|-------------------------------------|-----------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | 0 | Zvolte položku. | 45 |
| | 1.2 Computer and information sciences | 0 | Zvolte položku. | |
| | 1.3 Physical sciences | 1 | Basic Research | |
| | 1.4 Chemical sciences | 19 | Basic Research | |
| | 1.5 Earth and related environmental sciences | 0 | Zvolte položku. | |
| | 1.6 Biological sciences | 23 | Basic Research | |
| | 1.7 Other natural sciences | 2 | Basic Research | |
| 2. Engineering and Technology | 2.1 Civil engineering | 0 | Zvolte položku. | 34 |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | 1 | Basic Research | |
| | 2.3 Mechanical engineering | 0 | Zvolte položku. | |
| | 2.4 Chemical engineering | 2 | Balanced basic and applied research | |
| | 2.5 Materials engineering | 0 | Zvolte položku. | |
| | 2.6 Medical engineering | 0 | Zvolte položku. | |
| | 2.7 Environmental engineering | 0 | Zvolte položku. | |

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

| | | | | |
|---|--|--------------|-------------------------------------|--------------|
| | 2.8 Environmental biotechnology | 2 | Balanced basic and applied research | |
| | 2.9 Industrial biotechnology | 4 | Balanced basic and applied research | |
| | 2.10 Nanotechnology | 1 | Balanced basic and applied research | |
| | 2.11 Other engineering and technologies | 24 | Balanced basic and applied research | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | 2 | Basic Research | 9 |
| | 3.2 Clinical medicine | 1 | Basic Research | |
| | 3.3 Health sciences | 6 | Basic Research | |
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | 5 | Balanced basic and applied research | 11 |
| | 4.2 Animal and Dairy science | 2 | Balanced basic and applied research | |
| | 4.3 Veterinary science | 0 | Zvolte položku. | |
| | 4.4 Other agricultural sciences | 4 | Basic Research | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | 0 | Zvolte položku. | 0 |
| | 5.2 Economics and Business | 0 | Zvolte položku. | |
| | 5.3 Education | 0 | Zvolte položku. | |
| | 5.4 Sociology | 0 | Zvolte položku. | |
| | 5.5 Law | 0 | Zvolte položku. | |
| | 5.6 Political science | 0 | Zvolte položku. | |
| | 5.7 Social and economic geography | 0 | Zvolte položku. | |
| | 5.8 Media and communications | 0 | Zvolte položku. | |
| | 5.9 Other social sciences | 0 | Zvolte položku. | |
| 6. Humanities and the Arts | 6.1 History and Archaeology | 1 | Basic Research | 1 |
| | 6.2 Languages and Literature | 0 | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | 0 | Zvolte položku. | |
| | 6.4 Arts (arts, history of arts, performing arts, music) | 0 | Zvolte položku. | |
| | 6.5 Other Humanities and the Arts | 0 | Zvolte položku. | |
| Total | | 100 % | - | 100 % |

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

- 1) The high scientific and societal prestige of the FFBT staff is proven by awards they received in the field of R&D&I. Specifically, we would like to point out award L'Oréal UNESCO For Women In Science for Ing. Silvie Rimpelová, Ph.D. as a result of her outstanding contribution to scientific progress. The group of successful Ph.D. students and Early career researchers from the Department of Food Analysis and Nutrition was awarded by prestigious Harvey W. Wiley Award and AOAC INTERNATIONAL Awards, supported by contributions from SCIEX and Eurofins. International panels of analytical science experts appreciated advances in the portable food analysis field (smartphone-based assay) along with LC-MS-based metabolic fingerprinting strategies developed at FFBT. In 2022, Ing. Bronislav Jurásek received the prestigious Sanofi award for pharmacy (French Embassy) from the Nobel Prize winner in Chemistry, Prof. Jean-Marie Lehn. In the 2019 – 2023 reporting period, Prof. Ing. Zdeněk Bubník, CSc., Prof. Ing. Pavel Kadlec, DrSc. and Prof. Ing. Mojmír Rychtera, CSc. received awards for their lifetime contributions in the field of biotechnology and food technology. To sum it up, prestigious awards were awarded regardless of the age of the scientists, gender and their R&D&I field. It means that R&D&I is carried out at an excellent level at all Departments of FFBT.
- 2) The faculty employees are internationally recognised scientists active in editorial boards of prestigious journal. In addition, Prof. Kateřina Demnerová is editor-in-chief of the Czech Journal of Food Sciences (ISSN 1212-1800), which is an international open access peer-reviewed journal publishing original research articles, critical review, and short communications dealing with food technology and processing (including food biochemistry, microbiology, analyse, engineering, nutrition and economy). FFBT experts are frequently invited as speakers to international conferences and FFBT also organizes lectures provided by foreign scientists and other guests.
- 3) The FFBT strengthens its position in the research community by organizing prestigious international conferences. The most notable example of organized event is International Symposium on RECENT ADVANCES IN FOOD ANALYSIS (RAFA) held traditionally in Prague, by the University of Chemistry and Technology, Prague (UCT Prague, Czech Republic) in collaboration with Wageningen Food Safety Research (WFSR), part of Wageningen University & Research (The Netherlands). In 2019, before the Covid-19 pandemic, 820 delegates from 53 countries participated in the attractive program of the symposium offering 146 lectures and 495 posters, 16 vendor seminars, and state-of-the-art exhibition of advanced analytical instrumentation, and other equipment relevant to food analysis. RAFA supported also young generation and allocated 23% of all lectures to young scientists to present their research activities. RAFA, as one of the

biggest symposium series in Europe focused on contemporary trends in analytical & bioanalytical strategies in food quality, authenticity and safety control and other related topics such as transparency, circular bioeconomy and sustainability supported the scientific communities, as well as policy makers, food inspection and control authorities, food business operators, effectively dealing with the main associated challenges. Integral parts of this event were also (i) EU Reference Laboratories Colloquium on “Experiences, Achievements and Challenges Addressed by EU Reference Laboratories” and (ii) Food Authorities’ Summit — EU and Beyond, that included a seminar from the United States Department of Agriculture (USDA) on “Food Safety Issues Beyond the EU” as well as workshops on “Food Safety in China: Past, Present and Future” led by China National Center for Food Safety Risk Assessment (CFSA). This demonstrates that RAFA represents global platform for sharing knowledge among key stakeholders on cutting-edge research and innovative solutions with high added value for civil society and traditionally provides forum for discussion on challenges and novel approaches in food and natural products analysis. It creates strategic bridge with various stakeholders, thus increasing potential for networking and future collaborations in the field both in Europe and worldwide. The pandemic situation has not changed RAFA's popularity, series continued in 2021 by virtual event that was attended by 1650 participants. In 2022, after pandemic, RAFA came back as on-site event with participation of 520 delegates. In the 2019 – 2023 reporting period, FFBT participated in the organization of the International Conference on Chemical Technology (ICCT) and a number of other relevant conferences (International Conference on Polysaccharides – Glycoscience, BioTech 2020) and symposia (8th Czech-Swiss Symposium).

- 4) Next examples of highly recognized scientific outputs are monographs written in English. The revised second edition of *The Chemistry of Food* (Wiley-Blackwell, 2020), written by internationally recognized authors JAN VELÍŠEK, RICHARD KOPLÍK, AND KAREL CEJPEK - current and past Professors of Food Chemistry and Analysis at FFBT, provides a comprehensive overview of important compounds constituting of food and raw materials for food production. Authors highlighted food’s structural features, chemical reactions, organoleptic properties, nutritional, and toxicological importance. Book completed and fully up-to-date information on food chemistry, from structural features to applications. Next notable example is the book *Measurement and Control of Chemical, Food and Biotechnological Processes* (London: STS Science Centre Ltd., 2019), written by internationally recognized authors doc. Miloš Kmínek, and prof. Pavel Kadlec. It provided readers with basic knowledge from a rapidly developing area of automatic process control and technological measurements. The book is a very extensive work that covers the issues of measurement and control both in industrial and laboratory practice of most technological fields of manufacturing. It is intended for a wider professional public, students of technological faculties and employees in the chemical, food and biotechnology industries. It is worth noting that important monographs focused on malting and brewing were published in the 2019-2023 reporting period.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the award | Awarding institution |
|---|--|---|
| Ing. Silvie Rimpelová, Ph.D. | L'Oréal UNESCO For Women In Science, Czech Republic - talent program, 2019 | United Nations Educational, Scientific and Cultural Organization (UNESCO) |
| Prof. Ing. Zdeněk Bubník, CSc. | ESST Science Award 2019 | European Society of Sugar Technology |
| Prof. Ing. Pavel Kadlec, DrSc. | ESST Science Award 2019 | European Society of Sugar Technology |
| Ing. Aristeidis Tsagkaris | 2020 AOAC INTERNATIONAL/ Eurofins Foundation "Testing for Life" Student Award | Association of Official Analytical Chemists (AOAC) INTERNATIONAL |
| Ing. Kateřina Maštovská, Ph.D. | 2021 Harvey W. Wiley Award | Association of Official Analytical Chemists (AOAC) INTERNATIONAL |
| Ing. Klára Navrátilová | 2021 AOAC INTERNATIONAL/SCIEX Rising Star Award | Association of Official Analytical Chemists (AOAC) INTERNATIONAL |
| Ing. Leoš Uttl | 2021 AOAC INTERNATIONAL/ Eurofins Foundation "Testing for Life" Student Award. | Association of Official Analytical Chemists (AOAC) INTERNATIONAL |
| Ing. Bronislav Jurásek, Ph.D. | Sanofi Price for Pharmacy 2022 | French Embassy |
| Ing. Tomáš Příbyl | Crytur Award 2022 (2 nd place) | Crytur |
| Prof. Ing. Mojmír Rychtera, CSc. | The personality of Czech chemistry 2022 | Chemical Industry Association of the Czech Republic |

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of scientific journal, ISSN |
|---|--|
| Kateřina Demnerová, prof. Ing. CSc. | International Microbiology, 1139-6709 |
| Kateřina Demnerová, prof. Ing. CSc. | International Biodeterioration and Biodegradation, 0964-8305 |
| Kateřina Demnerová, prof. Ing. CSc. | Czech Journal of Food Sciences, Editor-in-Chief, 1212-1800 |
| Jana Hajšlová, prof. Ing. CSc. | Food Additives and Contaminants: Part A, 1944-0057 |
| Jan Káš, prof. Ing. DrSc. | Biotechnology Advances, 0734-9750 |
| Andrej Sinica, doc. Mgr. Ph.D. | Carbohydrate Polymers, 1879-1344 |
| Milena Stránská, prof. Ing. Ph.D. | World mycotoxin journal, 1875-0710 |
| Tomáš Macek, prof. Ing. CSc. | Trends in Biotechnology, 1879-3096 |
| Ondřej Uhlík, prof. Ing. Ph.D. | Frontiers in Microbiology, 1664-302X |
| Vojtěch Spiwok, prof. Ing. Ph.D. | Chemical Papers, Editor in Chief, 0366-6352 |

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Invited lecture title | Name of host institution, or name of conference or event | Year |
|---|--|---|-------------------|
| Petra Patáková, prof. Ing. Ph.D. | Production of biofuels by microorganisms | University of Insubria, Italy | 2021, 2022 |
| Aristeidis Tsagkaris, Ing. Ph.D. | A point-of-care device with smartphone read-out for the rapid screening of chlorpyrifos intoxication incident | 13th conference of Rapid Methods Europe (RME) 2021, online event, 1-3 February 2021. | 2021 |
| Milena Stránská, prof. Ing. Ph.D. | (Modified) mycotoxins during malting and brewing, new analytical possibilities to check the quality and safety of malt-based products. | Analytica, Munich, Germany, 19.-22.10. 2020 (changed to online event due to Covid-19) | 2020 |
| Kamil Parkan, doc. Ing. Ph.D. | Stereoselective and Visible-Light Mediated 1,2-cis- α -Thio-Glycosylation of 2-Substituted Glycals | ICPAC KK 2022, Kota Kinabalu, Malaysia, November 22–27, 2022 | 2022 |
| Pavel Kadlec, prof. Ing. DrSc. | Measurement and Process Control in Sugar Technology | 7th ESST/VDZ Conference & Exhibition in Reims, France | 2022 |
| Vojtěch Spiwok, prof. Ing. Ph.D. | 20 years of Metadynamics | CECAM Flagship Workshop, Lausanne, Switzerland | 2022 |
| Vojtěch Spiwok, prof. Ing. Ph.D. | Enhanced sampling methods with PLUMED | CECAM Flagship Workshop, Lausanne, Switzerland | 2023 |
| Štěpánka Kučková, doc. Ing. Mgr. Ph.D. | Proteomics in art, archeology and paleontology | APS Annual Conference 2023, Kassel, Germany | 2023 |
| Martin Kuchař, doc. Ing. Ph.D. | Psychedelics-Assisted Psychotherapy: Novel Treatments of Mental Health Disorders | Joint Prague-Weizmann School on Drug Discovery, 26.11.2021, Czech Republic | 2021 |
| Jan Kyselka, doc. Ing. Ph.D. | SINGLE CELL OILS: lipidomics, physical refining and valorisation of biologically active compounds | Technical University of Munich, Germany | 2022 |

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

| Name, surname and title(s) of the lecturer | Lecturer's employer at the time of the lecture | Invited lecture title | Year |
|--|--|--|--------------------|
| Ana-Lopez Contreras, Ph.D. | University of Wageningen, Netherlands | Production of acids and solvents from macroalgae biomass | 2023 |
| Nonappa Nonappa, prof. | Aalto University, Finland | Precision Nanoparticle Self-assembly and 3D Imaging | 2019 |
| Viviana Orlandi, Ph.D. | University of Insubria, Italy | Searching for next generation antimicrobial strategies | 2022 |
| Gianluca Molla, Ph.D. | University of Insubria, Italy | Exploiting molecular biotechnology for a sustainable re(up)cycling of wastes | 2022 |
| Antonio Vicente, Assoc. Prof. | Food Biotechnology and Bioengineering, University of Minho, Braga, Portugal | Application of biopolymers for nanotechnology in food applications (including encapsulation of bioactive compounds and their behaviour during digestion) | 2021 |
| Johann Wojta, Ao. Univ. Prof. Dr. | Medical University of Vienna, Austria | Monocytes and macrophages as versatile players in atherosclerosis: from atherothrombosis to degradation of neutrophil extracellular traps and beyond | 2023 |
| Michael Rychlik, Prof. Dr. | Technical University of Munich, School of Life Sciences, Germany | Food Toxicology (Visiting Professors in the MSc study programme in "Chemistry and analysis of food") | 2020 - 2023 |
| Michele Suman, Assoc. Prof. Ph.D. | Barilla SpA - Analytical Food Science / Food Safety & Authenticity Research Manager, Italy | Strategies for food authentication: case studies within food industry (Visiting Professors in the MSc study programme in "Chemistry and analysis of food") | 2022 - 2023 |
| Josep Rubert Bassedas, Ph.D. | Wageningen University & Research, Wageningen, Netherlands | Deciphering the gut microbiota function by LC/GC-MS metabolomics approaches | 2021 |
| Subhash Vasudevan, prof. PhD. | Duke-NUS Medical School, Singapur | Conformational plasticity of flaviviral NS5 protein – lessons from dengue and zika viruses. | 2019 |

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the research project/programme call | Name of the contracting Authority/guarantor of the project/programme call | Year |
|---|---|--|---------------------------------|
| Petra Patáková, prof. Ing. Ph.D. | MSCA Postdoctoral Fellowships | European Commission | 2019 |
| Milena Stránská, prof. Ing. Ph.D. | INTER-EXCELLENCE II, INTER-COST | Ministry of Education, Youth and Sport of the Czech Republic | 2019 - 2023 |
| Martin Kuchař, doc. Ing. Ph.D. | Programme call SONATA | National Science Centre Poland | 2021 - 2023 |
| Milena Stránská, prof. Ing. Ph.D. | Program ZEMĚ II – Smart agriculture | The Ministry of Agriculture of the Czech Republic | 2023 |
| Jana Hajšlová, prof. Ing. Ph.D. | INTER-EXCELLENCE II, INTER-COST | Ministry of Education, Youth and Sport of the Czech Republic | 2019 - 2023 |
| Jana Hajšlová, prof. Ing. Ph.D. | Program ZEMĚ II | The Ministry of Agriculture of the Czech Republic | 2019 - 2023 |
| Milena Stránská, prof. Ing. Ph.D. | GACR standard projects (Panel P503, Food technology, ecotoxicology and environmental chemistry) | Czech Science Foundation (GACR) | 2019 - 2022 |
| Jana Hajšlová, prof. Ing. Ph.D. | Program Environment for Life and other TACR programs | Technology Agency of the Czech Republic (TACR) | 2019 - 2023 |
| Ondřej Uhlík, prof. Ing. Ph.D. | GACR standard projects (Panel P504, Landscape management, forestry and soil biology, ecosystem ecology) | Czech Science Foundation (GACR) | 2019 - 2020, 2022 - 2023 |
| Tomáš Macek, prof. Ing. Ph.D. | Standard projects (Environmental Biotechnology and "Aga Khan" calls) | The Foundation for Science and Technology (FCT); Ministry of Education, Science and Innovation, Portugal | 2019 - 2020 |

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

From the list of 51 projects in the role of beneficiary and 80 projects in the role of another participant, we selected 10 representative European and national projects that reflected extraordinary societal impacts, interdisciplinarity, application potential, the mission of the FFBT as an evaluated unit, and faculty R&D&I capacities. Revenues from FFBT contract research activities exceeded 151,210 thousand CZK/5,965 thousand EUR as shown in Table 3.3.2.

1) Infrastructure for Promoting Metrology in Food and Nutrition in the Czech Republic (METROFOOD-CZ)

Co-participant at the FFBT: prof. Ing. Jana Hajšlová, CSc. (ORCID=0000-0001-7443-4280)

Solution period: 01. 01. 2019 – 31. 12. 2022

Provider: Ministry of Education, Youth and Sports

Number of participants: 2 universities, 1 public research institution

Recognised costs: 13 087 thou. CZK/516 thou. EUR (34.9 %) for FFBT from total 37 548 CZK thou. CZK/1 481 thou. EUR

R&D&I field: 4. Agricultural and Veterinary Sciences

FORD: 40401 - Agricultural biotechnology and food biotechnology

Type of research: applied

Project description: METROFOOD-CZ was a new and unique research infrastructure in the field of food and nutrition. Its main objective was to operate and promote new interdisciplinary research from primary agricultural production, food processing and technology to quality, authenticity, safety and traceability of food, raw materials, food products and supplements. METROFOOD-CZ enabled not only the use of top instrumentation for agricultural products and food analysis, the development

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

of new food products and the verification of innovative technologies, but also provided experts in the agri-food sector and metrology.

Contribution to the mission of FFBT: METROFOOD-CZ provided its services to a wide range of users, researchers, academics, government supervisors, food retailers, consumers and the general public. These end-users could be public and private research laboratories and research groups; food companies; institutions and services. METROFOOD-CZ ensured open access approach and networking.

Results overview: 126 articles in the WoS, 1 patent, 4 functional samples, 5 utility models

Ongoing research and cooperation: Infrastructure for Promoting Metrology in Food and Nutrition in the Czech Republic (LM2023064, 2023 - 2026)

Project evaluation: The large research infrastructure provided services to the scientific community from the Czech Republic and abroad in accordance with goals of the project and ensured the participation of the Czech Republic in transnational structures of EU.

2) Pulsed electric field as an innovative tool for decreasing *Fusarium* micromycetes and mycotoxins in the barley-malt-beer production chain

Beneficiary from FFBT: prof. Ing. Milena Stránská, Ph.D. (ORCID=0000-0002-2958-1529)

Solution period: 01. 01. 2022 – 31. 12. 2024

Provider: Czech Science Foundation

Number of participants: FFBT (UCT Prague) with public research institution

Recognised costs: 6 967 thou. CZK/275 thou. EUR (72.1 %) for FFBT from total 9 665 thou. CZK/381 thou. EUR

R&D&I field: 1. Natural Sciences

FORD: 1.4 Chemical sciences

Type of research: applied

Project description: Aim of the project was an effective control of *Fusarium* infection of barley, which is of a high concern for malting industry due to the risk of mycotoxins production. Although number of physical, chemical and biological methods has been tested, none of them has met all the required criteria regarding effectiveness, and quality of malt used for brewing. In this context, pulsed electric field (PEF) represents a challenging technological intervention providing microbial inactivation with minimum undesirable side effects. Current project comprised novel genomic, transcriptomic and metabolomic approaches, based on modern molecular genetic methods and high resolution mass spectrometry, to characterize the physico-chemical and (bio)chemical changes occurring after application of PEF on *Fusarium* infected barley.

Contribution to the mission of FFBT: Influence of PEF on quality parameters of processing intermediates and final malt and beer contributed to interdisciplinarity mission of FFBT and strengthen the cooperation of technologist, processing engineers along with analytical chemists.

Results overview: 6 articles in the WoS

Project evaluation: ending multi-year project succeeded with excellent applied results

3) Biorefinery Research Centre of Competence

Co-participant at the FFBT: prof. Ing. Karel Melzoch, CSc. (ORCID= 0000-0003-0081-8542)

Solution period: 01. 03. 2012 – 31. 12. 2019

Provider: Technology Agency of the Czech Republic

Number of participants: 2 universities, 4 industrial companies, 2 public research institutions from Czech Academy of Science (CAS)

Recognised costs: 55 107 thou. CZK/2 174 thou. EUR (16.4 %) for FFBT from total 335 286 thou. CZK/13 226 thou. EUR

R&D&I field: 2. Engineering and Technology

FORD: 2.4 Chemical engineering, 2.5 Material engineering, 2.8 Environmental biotechnology, 2.9 Industrial biotechnology and 2.11 Other engineering and technologies

Type of research: applied

Project description: Interdisciplinary project aims to create Biorefinery research centre with high innovation potential for sustainable utilization of renewable sources, and brings the Czech Republic to the leading position in the next generation biorefining. Presented project successfully connected the private sector with academic experts from plant biosciences, analytical chemistry, enzymology, microbiology, chemical and biochemical engineering, biotechnology, material engineering, and life cycle assessment. Co-investigators developed new advanced environmentally clean processes for biorefinery of biomass (microbial, plant, animal) in order to obtain products with high-added market value and thereby increased the market opportunities of participating companies and promote job creation.

Contribution to the mission of FFBT: Development of educational programs for recent graduates and young scientific workers to create experts in emerging technologies and create opportunities for their employment. Contribution of the Czech Republic's independence on fossil fuels, help to reduce greenhouse gas emissions.

Results overview: 33 articles in the WoS, 30 other Jimp articles, 32 book chapters, 13 patents, 7 functional samples, 5 utility models, 3 pilot plants, 3 verified technologies, 6 certified methodologies

Ongoing research and cooperation: Biorefining as circulation technology (TN01000048 NCC BIOCIRTECH, 2019 – 2022)

Project evaluation: project succeeded with excellent results of international significance.

4) New synthetics drugs - complex interdisciplinary research centre

Beneficiary from FFBT: Doc. Ing. Martin Kuchař, Ph.D. (ORCID=0000-0002-7616-6352)

Solution period: 01. 01. 2017 – 31. 12. 2020

Provider: Ministry of Interior

Number of participants: 1 university, 1 public research institution, 1 commercial company

Recognised costs: 13 767 thou. CZK/543 thou. EUR (32.3 %) for FFBT from total 42 591 thou. CZK/1 680 thou. EUR

R&D&I field: 1. Natural Sciences

FORD: 1.4 Chemical Sciences

Type of research: applied

Project description: The main goal of the project was to create a framework of multidisciplinary cooperation among law enforcement agencies, public health officials, toxicologic organizations, outreach services, epidemiologists and new synthetic drugs (NSD) research institutions not only in the Czech Republic, but also at European level. The objectives were to develop and to realize effective detection of NSD directly by TOXI teams in the field and to complete New Synthetic Drugs Database (Directive of Police President for Narcotic Crime under preparation). Achieved results enabled to react dynamically on presence of new synthetic drugs on illegal market, identification of new precursors of synthetic drugs, development of laboratory methods for NSD identification in serum, saliva and urine.

Contribution to the mission of FFBT: The contribution of FFBT experts helped to fight against new synthetic drugs on illegal market at EU. The New synthetic drug research centre became a national authority and knowledge partner for public and abroad partners. In addition, the project supported early career researchers from FFBT and their networking with EU authorities.

Results overview: 56 articles in the WoS, 14 certified methodologies, 2 functional samples

Ongoing research and cooperation: Current project follows and develops results of preceding successful project NSD VG20122015075.

Project evaluation: project succeeded with excellent results of international significance

5) National Institute of Virology and Bacteriology

Co-participant at the FFBT: prof. Dr. Ing. Michaela Rumlová, Ph.D. (ORCID=0000-0002-5645-8227)

Solution period: 01. 06. 2022 – 31. 12. 2025

Provider: Ministry of Education, Youth and Sports

Number of participants: 4 universities, 4 public research institution from CAS

Recognised costs: 78 740 thou. CZK/3 106 thou. EUR (5.3 %) for FFBT from total 1 483 409 thou. CZK/58 517 thou. EUR

R&D&I field: 1. Natural Sciences

FORD: 10606 – Microbiology, 10607 - Virology

Type of research: balanced basic and applied

Project description: The main objective of the project was to concentrate excellent research teams of the Czech Republic in the National Institute of Virology and Bacteriology (NIVB) in order to implement a common research agenda in the field of virology, bacteriology and the development of antiviral and antibacterial treatments. The NIVB aimed to develop safe and effective antiviral and antibacterial therapies and prepare platforms for future drug discovery and development against viruses and bacteria with pandemic potential.

Contribution to the mission of FFBT: The NIVB with experts from FFBT became a national authority and knowledge partner for public and abroad authorities. In addition, the project supported early career researchers from FFBT and their networking with EU and USA universities and partners.

Results overview: 127 articles in the WoS, 3 patents, 1 utility model

Ongoing research and cooperation: Strong cooperation was established with California Institute of Technology (USA), Stanford University (USA), The Rockefeller University (USA), The University of Texas at Austin (USA), The University of British Columbia (CAN), Technical University of Munich (DE), Karolinska Institute (SWE), Tokyo Metropolitan Institute of Public Health (JPN) and others.

Project evaluation: running multi-year project

6) Microbiomes of Selected Extreme Biotopes – Their Phylogenetic Diversity and Functional Potential

Beneficiary from FFBT: prof. Ing. Bc. Ondřej Uhlík, Ph.D. (ORCID=0000-0002-0506-202X)

Solution period: 01. 11. 2019 – 31. 12. 2022

Provider: Ministry of Education, Youth and Sports

Number of participants: 1 (FFBT, UCT Prague)

Recognised costs: 6 177 thou. CZK/244 thou. EUR (100 %) for FFBT

R&D&I field: 1. Natural Sciences

FORD: 1.6 Biological Sciences

Type of research: basic

Project description: The goal of the project was the cultivation and phylogenetic characterization of microbial populations of extreme environments by chronosequencing of permafrost (permafrost of differing age) from central Alaska and soils from salt marshes and moffettes of the Soos National Natural Reserve, Czech Republic. The resuscitation factor was found to effectively increase the growth of soil bacterial species, including previously uncultivated. Phylogenetically novel taxa were characterized. Phylogenetic and metagenomic analyses revealed populations present and metabolically active. FFBT researchers also intended to implement MALDI-TOF mass spectrometry for routine species-level determination of bacterial isolates.

Contribution to the mission of FFBT: The presented project significantly contributed to the implementation of a new direction of R&D&I at the Department of Biochemistry (FFBT, Dept. 320), a shift from traditional cultivation of microbial isolates to metagenomics and microbial ecology. This is an INTER-ACTION project that deepens cooperation and networking with the USA partners. Doctoral students were significantly involved into international research activities.

Results overview: 6 articles in the WoS

Ongoing research and cooperation: The project supported early career researchers from FFBT. Moreover, gender dimension and inclusive approach were reflected.

Project evaluation: project succeeded with excellent results of basic research

7) Delivering an Effective, Resilient and Sustainable EU-China Food Safety Partnership (EU-China-Safe)

Co-participant at the FFBT: prof. Ing. Jana Hajšlová, CSc. (ORCID=0000-0001-7443-4280)

Solution period: 01. 09. 2017 – 28. 2. 2022

Provider: EU Horizon 2020 Project, Research and Innovation Action

Number of participants: 16 participants from the EU and 17 from China, EU-China-Safe contains key research organisations, government and industry

Recognised costs: 10 824 thou. CZK/507 thou. EUR (4.7 %) for FFBT from total 288 204 thou. CZK/11 369 thou. EUR

R&D&I field: 1. Natural Sciences

FORD: 1.4 Chemical Sciences

Type of research: applied

Project description: EU-China-Safe built the core components needed for a joint EU-China food safety control system comprising: control management, food legislation, food inspection, food control laboratories, and food safety and quality information, education and communication. Project improved detection capabilities for chemical/microbiological hazards and food fraud will be implemented in a harmonised way across the EU-China network. Trade barriers caused by food safety and fraud issues were analysed and recommendations of how to predict and prevent future events were disseminated.

Contribution to the mission of FFBT: Substantial knowledge transfer and training actions built high-level and long-term collaboration, synergies and trust between our faculty, prestigious EU and China actors. The contribution of FFBT experts helped to overcome EU-China trade barriers caused by food safety and fraud issues.

Results overview: 68 articles in the WoS; <http://www.euchinasafe.eu>

Ongoing research and cooperation: Strong cooperation was established with BUNDESINSTITUT FÜR RISIKOBEWERTUNG (DE), Wageningen Food Safety Research (NLD), Queen's University Belfast (UK), Chinese Academy of Inspection And Quarantine (CHN), China National Centre for Food Safety Risk Assessment (CHN), Hong Kong Polytechnic University (HKG) National Research Institute of Food & Fermentation Industries (CHN), and industrial companies (Nestle, NOFIMA AS, Danone etc.).

Project evaluation: project succeeded with excellent results of international significance

8) Impact of reformulation on the shelf-life and physical and chemical properties of food products

Beneficiary from FFBT: doc. Ing. Aleš Rajchl, Ph.D. (ORCID=0000-0002-4888-8323)

Solution period: 01. 01. 2019 – 31. 12. 2023

Provider: Ministry of Agriculture

Number of participants: 2 universities, 2 public research institutions, 2 commercial companies

Recognised costs: 8 755 thou. CZK/345 thou. EUR (46.9 %) for FFBT from total 18 677 thou. CZK/737 thou. EUR

R&D&I field: 2. Engineering and Technology

FORD: 2.11 Other engineering and technologies (Food and Beverages)

Type of research: applied

Project description: The aim of the project was to evaluate the influence of reformulation of selected food products on their stability and quality, and to inform consumers about benefits of reformulation on human health. The issue of reformulated food production technology and the effect of these

reformulations on the food product shelf-life was also addressed. The project was focused on the reformulation of key food categories, especially of dairy, meat and bakery products with regard to their nutritional composition, applied production technology, physicochemical and sensory properties and the overall shelf-life of the product.

Contribution to the mission of FFBT: Reformulation of key bakery, dairy and meat product categories enhanced their nutritional profile and thus, results of the project contributed to a healthier diet in the Czech Republic, characterized by lower intake of sodium, reduced intake of saccharides, *trans* and saturated fatty acids, and increased digestibility of selected nutrients after fermentation. The project results also popularized food science and technology at FFBT and made it accessible to the general public.

Results overview: 10 articles in the WoS, 1 book, 9 workshops, 2 utility models

Ongoing research and cooperation: Current project develops results of preceding successful project New sustainable processing technologies for use of domestic oilseed crops.

Project evaluation: project succeeded with excellent applied results

9) Smartphone analyzers for on-site testing of food quality and safety

Co-participant at the FFBT: prof. Ing. Jana Hajšlová, CSc. (ORCID=0000-0001-7443-4280)

Solution period: 01. 01. 2017 – 31. 03. 2021

Provider: EXCELLENT SCIENCE – H2020 Marie Skłodowska-Curie Actions INT

Number of participants: 7 Training Sites (3 universities, 3 research centres, 1 innovation SME), plus 2 Partner Organisations (1 global food industry and 1 diagnostics SME)

Recognised costs: 5 552 thou. CZK/219 thou. EUR (7.9 %) for FFBT from total 70 346 thou. CZK/2 775 thou. EUR

R&D&I field: 1. Natural Sciences

FORD: 1.4 Chemical Sciences

Type of research: applied

Project description: FoodSmartphone project studied the supra-disciplinary challenge of smartphone-based analysis systems having advanced biorecognition, signal transduction, microfluidic sample handling and image data handling solutions. Participants successfully developed unique range of smartphone-based on-site screening analyses for food quality and safety issues of concern, viz. for pesticides, allergens, mycotoxins, food spoilage organisms and marine toxins. Project brought the lab to the sample site. It accelerated detection speeds, allowed results to be recorded quickly and in real time. Project clearly shown that smartphone-enabled food analysis will be the future.

Contribution to the mission of FFBT: FoodSmartphone project substantially improved the career prospects of early-stage researchers across our faculty. Moreover, gender dimension and inclusive approach were reflected. The project results popularized science at FFBT and made it accessible to the general public in the Czech Republic and abroad.

Results overview: 31 articles in the WoS

Ongoing research and cooperation: Strong cooperation was established with Wageningen Food Safety Research (NLD), Queen's University Belfast (UK), CSIC, Nanobiotechnology for Diagnostics

(Nb4D) Group (ESP), Linköping University (SWE), Centre suisse d'électronique et de microtechnique (CHE) and others.

Project evaluation: project succeeded with excellent results of international significance

10) Allosteric sites of SARS-CoV-2 RNA polymerase and exoribonuclease repair activity: promising targets for novel antivirals

Beneficiary from FFBT: prof. Dr. Ing. Michaela Rumlová, Ph.D. (ORCID=0000-0002-5645-8227)

Solution period: 01. 01. 2022 – 31. 12. 2024

Provider: Czech Science Foundation

Number of participants: FFBT (UCT Prague) with public research institution (IOCB)

Recognised costs: 6 192 thou. CZK/244 thou. EUR (46.9 %) for FFBT from total 9 391 thou. CZK/370 thou. EUR

R&D&I field: 1. Natural Sciences

FORD: 1.6 Biological sciences

Type of research: basic

Project description: SARS-CoV-2 that emerged in 2019 has caused a global pandemic referred to as coronavirus disease 2019 (COVID-19). A severe impact on worldwide public health and global economies caused by SARS-CoV-2 infection has accelerated enormously not only vaccine development but also alerted the scientific community about the lack of effective antivirals for human coronaviruses. In this project, we aim to gain an insight into a molecular modulation of two enzymes of SARS-CoV-2 replication complex RNA-dependent RNA polymerase (RdRp) and Exoribonuclease (ExoN), which are critical for the viral lifecycle. Project aimed to characterise preselected allosteric binding sites of RdRp, modulate them to study their effect on regulation of polymerase activity, and design and synthesise novel potential allosteric non-nucleoside inhibitors.

Contribution to the mission of FFBT: The project aimed to develop safe and effective antiviral therapies and prepare platforms for future drug discovery and development against viruses.

Ongoing research and cooperation: Current project follows and develops results of preceding successful project GA22-25042S.

Project evaluation: ending multi-year project succeeded with excellent basic results

Table 3.3.1 Projects supported by public funds

| In the role of beneficiary | | | | | | |
|----------------------------|---|--------------------------------|------------------|------------------|-----------------|--------------|
| Provider ²⁵ | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | METROFOOD-RI Preparatory Phase Project | 0 / 0 | 1049 / 41 | 1053 / 42 | 712 / 28 | 0 / 0 |
| European comission | | 0 / 0 | 1049 / 41 | 1053 / 42 | 712 / 28 | 0 / 0 |
| GACR | Role of secondary plant metabolites in the ecology of soil microorganisms | 2872 / 113 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Relationship between butanol efflux and butanol tolerance of Clostridia | 2536 / 100 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Phospholipid metabolizing enzymes as new components of salicylic acid signalling pathway | 3362 / 133 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Interaction of nanoparticles modified by natural compounds with biofilms of pathogenic microorganisms | 2100 / 83 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Intracellular trafficking of retroviral proteins and recruitment of envelope glycoproteins | 1756 / 69 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Study of the role of capsid protein in early phase of HIV-1 replication cycle using the newly identified compounds stabilizing capsid complexes | 1647 / 65 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Ecology of extremophilic microorganisms in Czech spring waters of cultural heritage significance | 2596 / 102 | 2596 / 102 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | The prevalence and diversity of Campylobacter jejuni isolates and identification of factors facilitating their survival | 2542 / 100 | 2405 / 95 | 222 / 9 | 0 / 0 | 0 / 0 |
| GACR | Relationship between Vitis vinifera L. endophytes, and its metabolome | 2271 / 90 | 2273 / 90 | 87 / 3 | 0 / 0 | 0 / 0 |
| GACR | Correction of molecular mechanics potentials of drug-like molecules by property map | 1368 / 54 | 1368 / 54 | 1368 / 54 | 0 / 0 | 0 / 0 |
| GACR | Ecological functions of soil microorganisms govern by secondary plant metabolites | 0 / 0 | 2770 / 109 | 3070 / 121 | 3111 / 123 | 1165 / 46 |
| GACR | Pulsed electric field as an innovative tool for decreasing Fusarium micromycetes and mycotoxins in the barley-malt-beer production chain | 0 / 0 | 3138 / 124 | 3138 / 124 | 3138 / 124 | 178 / 7 |

| | | | | | | |
|--------------------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|
| GACR | Modulation of capsid protein hexameric lattice stability: a promising target for HIV-1 inhibition | 0 / 0 | 2160 / 85 | 2222 / 88 | 2222 / 88 | 0 / 0 |
| GACR | Impact of emerging chlorinated contaminants on adipogenesis | 0 / 0 | 0 / 0 | 2020 / 80 | 2020 / 80 | 1900 / 75 |
| GACR | Life at the Interface: Ecology of Plant-Associated Microorganisms | 0 / 0 | 0 / 0 | 0 / 0 | 2913 / 115 | 3950 / 156 |
| GACR | Allosteric sites of SARS-CoV-2 RNA polymerase and exoribonuclease repair activity: promising targets for novel antivirals | 0 / 0 | 0 / 0 | 0 / 0 | 2489 / 98 | 3049 / 120 |
| GACR | Interaction and structural changes of retroviral MA domain of Gag due to plasma membrane binding and implications for the maturation | 0 / 0 | 0 / 0 | 0 / 0 | 2418 / 95 | 2386 / 94 |
| GACR | Anti-inflammatory properties of bioactive compounds isolated from Cannabis sativa L. | 0 / 0 | 0 / 0 | 0 / 0 | 2991 / 118 | 4291 / 169 |
| GACR | Analysis and sampling of molecular simulations by adversarial autoencoders | 0 / 0 | 0 / 0 | 0 / 0 | 1555 / 61 | 1580 / 62 |
| GACR | Inhibitors from bio-waste processing: challenge or opportunity for the biotechnological production of chemicals by clostridia? | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1596 / 63 |
| GACR | | 32050 / 909 | 16710 / 659 | 12127 / 478 | 22857 / 902 | 20096 / 703 |
| Government office | New Psychoactive Substances information | 0 / 0 | 868 / 34 | 851 / 34 | 800 / 32 | 888 / 35 |
| Government office | | 0 / 0 | 868 / 34 | 851 / 34 | 800 / 32 | 888 / 35 |
| Ministry of Agriculture | Impact of reformulation on the shelf-life and physical and chemical properties of food products | 3660 / 144 | 3956 / 156 | 3979 / 157 | 3838 / 151 | 3264 / 129 |
| Ministry of Agriculture | Use of wastes from dairies for production of new dairy products and dietary supplements with the addition of microalgae and their components | 3041 / 120 | 3342 / 132 | 3342 / 132 | 3185 / 126 | 2480 / 98 |
| Ministry of Agriculture | New sustainable processing technologies for use of domestic oilseed crops | 0 / 0 | 0 / 0 | 0 / 0 | 3270 / 129 | 3270 / 129 |
| Ministry of Agriculture | The comprehensive laboratory strategy for identification of insect species intended for human consumption and the production of processed animal protein, authentication of insect-based foods. | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3998 / 158 |

| Ministry of Agriculture | | 6701 / 364 | 7298 / 288 | 7321 / 289 | 10293 / 406 | 13012 / 513 |
|--|--|-------------------|-------------------|-------------------|--------------------|--------------------|
| Ministry of Education, Youth and Sports | Production of biobutanol and succinic/lactic acid from lignocellulose biomass | 1785 / 70 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Fullerene inhibitors of HIV-1 | 918 / 36 | 1033 / 41 | 938 / 37 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Exposure biomarkers to selected air pollutants, health risk assessment in children population | 1242 / 49 | 929 / 37 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Microbial Cometabolism: Promoting Biodegradation of Pollutants | 267 / 11 | 1921 / 76 | 2157 / 85 | 2089 / 82 | 0 / 0 |
| Ministry of Education, Youth and Sports | Microbiomes of Selected Extreme Biotopes – Their Phylogenetic Diversity and Functional Potential | 242 / 10 | 1902 / 75 | 2082 / 82 | 1951 / 77 | 0 / 0 |
| Ministry of Education, Youth and Sports | Implementation of advanced analytical technologies for bioprospecting of microalgae | 213 / 8 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Autoencoders for multiscale modelling | 335 / 13 | 120 / 5 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Testing of the new compounds with potential for resistance modulation in multi drug resistant strains | 705 / 28 | 1072 / 42 | 947 / 37 | 636 / 25 | 0 / 0 |
| Ministry of Education, Youth and Sports | In vitro toxicological comparison of extracts of stressed transgenic and non-transgenic crops | 0 / 0 | 848 / 33 | 1438 / 57 | 1438 / 57 | 393 / 16 |
| Ministry of Education, Youth and Sports | The role of inflammation in the progression of atherosclerosis studied by metabolomic and proteomic tools | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 774 / 31 |
| Ministry of Education, Youth and Sports | Safe and tasty thermally processed foods prepared from low asparagine cereals | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 689 / 27 |
| Ministry of Education, Youth and Sports | | 5707 / 225 | 7825 / 309 | 7562 / 298 | 6114 / 241 | 1856 / 73 |
| Ministry of the Interior | Biosensors for monitoring epidemics of viral respiratory diseases | 0 / 0 | 0 / 0 | 5894 / 233 | 5894 / 233 | 0 / 0 |
| Ministry of the Interior | Development of New Methods and Tools for Detection and Investigation of Pharmacrime to Enhance Social Protection | 3729 / 147 | 2713 / 107 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | New synthetic drugs - complex interdisciplinary research centre | 3428 / 135 | 3483 / 137 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Pharmacrime – forensic identification of prohormones and counterfeit medicine | 0 / 0 | 0 / 0 | 19587 / 773 | 3650 / 144 | 3650 / 144 |
| Ministry of the Interior | Field quantification of narcotic and psychotropic substances using NIR spectrometry | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 5126 / 202 |

| | | | | | | |
|---------------------------------|---|---------------------|---------------------|---------------------|---------------------|---------------------|
| Ministry of the Interior | New psychoactive substances: forensic-toxicology research center | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 9696 / 382 |
| Ministry of the Interior | | 7157 / 282 | 6196 / 244 | 25481 / 1005 | 9544 / 376 | 18472 / 729 |
| Other foreign | Increased assortment, quality and value of Norwegian frozen vegetables | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Other foreign | Ecological product innovation lab at the Moldovan Agrifood Business Incubator | 0 / 0 | 5 / 0 | 903 / 36 | 0 / 0 | 0 / 0 |
| Other foreign | Modulation of multidrug resistance and post-treatment regeneration stimulated by nature compounds | 0 / 0 | 65 / 3 | 189 / 7 | 0 / 0 | 0 / 0 |
| Other foreign | | 0 / 0 | 70 / 3 | 1092 / 43 | 0 / 0 | 0 / 0 |
| TACR | Wine products with added value | 2231 / 88 | 2344 / 92 | 2381 / 94 | 0 / 0 | 0 / 0 |
| TACR | Research and development of excipients for plant nutrition and vitality | 2285 / 90 | 2333 / 92 | 2268 / 89 | 2308 / 91 | 0 / 0 |
| TACR | Development of innovative analytical strategies for control of safety and authenticity of food and food materials | 1942 / 77 | 2321 / 92 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Biologically active substances from Microalgae and Plant stem cells for use in the Cosmetics industry | 2301 / 91 | 2622 / 103 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Innovative method of immunoglobulins administration | 0 / 0 | 725 / 29 | 1621 / 64 | 958 / 38 | 0 / 0 |
| TACR | | 8759 / 346 | 10344 / 408 | 6270 / 247 | 3266 / 129 | 0 / 0 |
| TOTAL | | 51370 / 2026 | 50360 / 1987 | 61756 / 2436 | 53587 / 2114 | 54323 / 2143 |

| In the role of another participant | | | | | | |
|------------------------------------|--|--------------------------------|-------------------|-------------------|-------------------|-------------------|
| Provider ²⁵ | | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Delivering an Effective, Resilient and Sustainable EU-China Food Safety Partnership | 3412 / 135 | 3219 / 127 | 1778 / 70 | 2399 / 95 | 0 / 0 |
| European comission | FOODSAFETY4EU - MULTI-STAKEHOLDER PLATFORM FOR FOOD SAFETY IN EUROPE | 0 / 0 | 0 / 0 | 484 / 19 | 2692 / 106 | 1216 / 48 |
| European comission | Smartphone analyzers for on-site testing of food quality and safety | 1836 / 72 | 1182 / 47 | 95 / 4 | 0 / 0 | 0 / 0 |
| European comission | The European Human Biomonitoring Initiative | 1824 / 72 | 1804 / 71 | 1675 / 66 | 0 / 0 | 0 / 0 |
| European comission | Screening for emerging chemical risks in the food chain | 0 / 0 | 0 / 0 | 719 / 28 | 870 / 34 | 681 / 27 |
| European comission | New system-driven bioremediation of polluted habitats and environment | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1892 / 75 |
| European comission | Plastic in Agricultural Production: Impacts, Lifecycles and LONG-term Sustainability | 0 / 0 | 0 / 0 | 413 / 16 | 1542 / 61 | 2843 / 112 |
| European comission | European Partnership for the Assessment of Risks from Chemicals | 0 / 0 | 0 / 0 | 0 / 0 | 126 / 5 | 534 / 21 |
| European comission | | 7073 / 279 | 6204 / 245 | 5164 / 204 | 7629 / 301 | 7166 / 283 |
| GACR | Very long chain fatty acids from microorganisms | 780 / 31 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Definition of physiological, metabolic and adaptation processes in the fern <i>Pteris cretica</i> growing on soils contaminated with arsenic | 1232 / 49 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Rare and uncommon flavonolignans: Chemo-enzymatic preparation and pharmacological activity | 799 / 32 | 799 / 32 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Influence of algal organic matter on properties of flocs formed during coagulation/flocculation in water treatment | 536 / 21 | 536 / 21 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Biomaterials based on octahedral molybdenum clusters as singlet oxygen radiosensitizers | 1526 / 60 | 1526 / 60 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Interactions of flaviviral genomic and subgenomic RNA with host and viral proteins | 1319 / 52 | 1319 / 52 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Biochar: the valorisation of solid wastes and improvement of soil properties | 1187 / 47 | 1355 / 53 | 1355 / 53 | 186 / 7 | 0 / 0 |

| | | | | | | |
|-------------------------|--|-------------------|-------------------|-------------------|-------------------|--------------------|
| GACR | Cadmium hyperaccumulation in macrofungi: from isotopes to proteins and bacterial communities | 1241 / 49 | 1250 / 49 | 1218 / 48 | 165 / 7 | 0 / 0 |
| GACR | Microporous polyurethanes with adjustable rate of biodegradation | 842 / 33 | 826 / 33 | 801 / 32 | 0 / 0 | 0 / 0 |
| GACR | Metabolites and selected derivatives of food flavonoids - preparation and biological activity | 0 / 0 | 0 / 0 | 1513 / 60 | 1506 / 59 | 1506 / 59 |
| GACR | Core-shell nanoparticles for targeted X-ray-induced photodynamic therapy | 0 / 0 | 0 / 0 | 1243 / 49 | 1243 / 49 | 1243 / 49 |
| GACR | Light-induced antibacterial and antiviral materials based on metal clusters | 0 / 0 | 0 / 0 | 1282 / 51 | 1282 / 51 | 1282 / 51 |
| GACR | Who is responsible here? Linking transformation of organochlorines with specific bacterial populations | 0 / 0 | 0 / 0 | 0 / 0 | 1338 / 53 | 2050 / 81 |
| GACR | Microbiologically induced calcite precipitation for production of carbon-negative building materials from recycled concrete | 0 / 0 | 0 / 0 | 0 / 0 | 733 / 29 | 961 / 38 |
| GACR | Augmentation of the effect of the biocontrol agent <i>Pythium oligandrum</i> with cold plasma against fungal biofilms | 0 / 0 | 0 / 0 | 0 / 0 | 1624 / 64 | 1624 / 64 |
| GACR | It takes two to tango: TBEV C protein-genomic RNA interactions | 0 / 0 | 0 / 0 | 0 / 0 | 1058 / 42 | 1548 / 61 |
| GACR | Investigation of prokaryotic and eukaryotic cell interactions with nanofibers differing in morphology and structure | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1411 / 56 |
| GACR | Mannose-6-phosphate/insulin-like growth factor 2 receptor ligands to study their in vitro effects in pathological and neural processes | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 980 / 39 |
| GACR | Genome dynamics and maintenance in simple and homogeneous natural prokaryotic communities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1020 / 40 |
| GACR | | 9462 / 373 | 7611 / 300 | 7412 / 292 | 9135 / 360 | 13625 / 537 |
| Ministry of Agriculture | Utilization of enzyme and probiotics potential of micro-organisms to develop new and improve the quality and durability of existing dairy and bakery products. | 990 / 39 | 990 / 39 | 930 / 37 | 855 / 34 | 831 / 33 |
| Ministry of Agriculture | Biocontrol of selected potato pathogenic bacteria | 350 / 14 | 385 / 15 | 385 / 15 | 365 / 14 | 0 / 0 |

| | | | | | | |
|---|---|-------------------|-------------------|-------------------|-------------------|-------------------|
| Ministry of Agriculture | Utilization of various metabolites of wild strains of lactic acid bacteria and yeasts to suppress the occurrence of undesirable fungal contaminants and to prolong the shelf life of dairy and bakery products. | 557 / 22 | 589 / 23 | 609 / 24 | 588 / 23 | 524 / 21 |
| Ministry of Agriculture | Research of metabolomic methods for laboratory authentication of apples geographicity. | 1360 / 54 | 1496 / 59 | 1496 / 59 | 1428 / 56 | 1224 / 48 |
| Ministry of Agriculture | Research and development of the medicinal mushroom production in the Czech Republic and their innovative application in functional foods | 953 / 38 | 1074 / 42 | 1074 / 42 | 1074 / 42 | 770 / 30 |
| Ministry of Agriculture | New approaches for the proof of fish meat adulteration using genomic DNA | 907 / 36 | 1014 / 40 | 983 / 39 | 937 / 37 | 792 / 31 |
| Ministry of Agriculture | Processing of waste products obtained during oil extraction from oil crop seeds on new commodities with nutritional and health benefits | 779 / 31 | 856 / 34 | 856 / 34 | 817 / 32 | 701 / 28 |
| Ministry of Agriculture | Innovation of potato growing systems in buffer zones of water resources with reduced pesticide and fertilizer inputs resulting in water pollution reduction and preservation of potato growers' competitiveness | 731 / 29 | 803 / 32 | 803 / 32 | 0 / 0 | 0 / 0 |
| Ministry of Agriculture | Assessment of honey authenticity by pollen grain analysis. | 987 / 39 | 1010 / 40 | 1012 / 40 | 0 / 0 | 0 / 0 |
| Ministry of Agriculture | Innovation of integrated production of vegetable in changing spectrum of means for pest control, improved monitoring of pest organisms and reduction of risks of pesticides in products | 0 / 0 | 0 / 0 | 1152 / 45 | 1217 / 48 | 1230 / 49 |
| Ministry of Agriculture | Postbiotics, bacterial exopolysaccharides and new oligosaccharides for functional synbiotic fermented products | 0 / 0 | 0 / 0 | 0 / 0 | 1257 / 50 | 1568 / 62 |
| Ministry of Agriculture | | 7614 / 300 | 8217 / 324 | 9300 / 367 | 8538 / 337 | 7640 / 301 |
| Ministry of Education, Youth and Sports | Czech National Infrastructure for Biological Data | 1086 / 43 | 1670 / 66 | 936 / 37 | 1505 / 59 | 1256 / 50 |
| Ministry of Education, Youth and Sports | Infrastructure for Promoting Metrology in Food and Nutrition in the Czech Republic (METROFOOD-CZ) | 3430 / 135 | 3424 / 135 | 3147 / 124 | 3086 / 122 | 0 / 0 |

| | | | | | | |
|--|--|-------------------|-------------------|-------------------|-------------------|---------------------|
| Ministry of Education, Youth and Sports | Czech National Infrastructure for Biological Data | 0 / 0 | 0 / 0 | 600 / 24 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | Infrastructure for Promoting Metrology in Food and Nutrition in the Czech Republic | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3261 / 129 |
| Ministry of Education, Youth and Sports | National Institute of Virology and Bacteriology | 0 / 0 | 0 / 0 | 0 / 0 | 4665 / 184 | 43490 / 1716 |
| Ministry of Education, Youth and Sports | | 4516 / 178 | 5094 / 201 | 4683 / 185 | 9256 / 365 | 48007 / 1894 |
| Ministry of Health | Critical evaluation of the lipidome in acute coronary syndrome and acute stroke patients in correlation with the level of oxidative stress | 1251 / 49 | 1251 / 49 | 1238 / 49 | 0 / 0 | 0 / 0 |
| Ministry of Health | Novel inhibitors of lipolysis in the treatment of lipid a glucose metabolism in obstructive sleep apnea syndrome | 0 / 0 | 0 / 0 | 798 / 31 | 1193 / 47 | 1192 / 47 |
| Ministry of Health | Psilocybin versus ketamine – fast acting antidepressant strategies in treatment-resistant depression | 0 / 0 | 0 / 0 | 390 / 15 | 771 / 30 | 728 / 29 |
| Ministry of Health | Influence of carotid atherosclerotic plaque metabolome on the embolization potential | 0 / 0 | 0 / 0 | 0 / 0 | 697 / 27 | 1085 / 43 |
| Ministry of Health | | 1251 / 49 | 1251 / 49 | 2426 / 96 | 2661 / 105 | 3005 / 119 |
| Ministry of Industry and Trade | Research and development of new generation of butter production machines with higher performance and efficient cooling system for use in warm climate zones. | 1783 / 70 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Nanofiber applications in food packaging | 799 / 32 | 1147 / 45 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Research and development of butterproduction machines of the highest performance | 1326 / 52 | 938 / 37 | 282 / 11 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Research and development of butter processing equipment | 0 / 0 | 122 / 5 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Complex development of a biological factor for brewing | 0 / 0 | 0 / 0 | 0 / 0 | 578 / 23 | 1114 / 44 |
| Ministry of Industry and Trade | Algal Biotechnology for Food - preparation of proteins and carotenes by heterotrophic cultivation of chlorophyll-deficient clones of microalgae | 899 / 35 | 494 / 19 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Biosensors for detection of bacterial contamination of drinking water. | 700 / 28 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |

| | | | | | | |
|---------------------------------------|---|--------------------|--------------------|-------------------|-------------------|------------------|
| Ministry of Industry and Trade | Research of Selective Innovative Technology for Enhancement of Co-metabolic Aerobic Microbial Degradation of Polychlorinated Organic Compounds for Remediation and Stabilization of POPs Contaminated Sites | 900 / 36 | 416 / 16 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | The development of manufacturing technology of peptide substance D-Phe-gonadorelin for preparing a pharmaceutical medicament | 650 / 26 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Extension of investigation - Bioremediation and bioactive foils | 1778 / 70 | 1778 / 70 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Isolation and application of plant products having effects against stress and other neurodegenerative diseases | 1600 / 63 | 1600 / 63 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Minimization of Influence of Residual Contamination After Illicit Production of Narcotics on Human Health | 1482 / 58 | 1482 / 58 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Development of a new Hydal PHA base material for microplate replacement. | 350 / 14 | 470 / 19 | 470 / 19 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Smart Fertilizers | 300 / 12 | 400 / 16 | 200 / 8 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Biotechnology of hemp cultivation for CBD products | 535 / 21 | 1030 / 41 | 1030 / 41 | 1050 / 41 | 0 / 0 |
| Ministry of Industry and Trade | Development of a new generation of RECLIME? recycling units for calcium (Ca++) recycling used to clean raw sugars and sugar cane | 0 / 0 | 378 / 15 | 419 / 17 | 594 / 23 | 0 / 0 |
| Ministry of Industry and Trade | | 13101 / 517 | 10255 / 405 | 2401 / 95 | 2222 / 88 | 1114 / 44 |
| Ministry of the Interior | Possibilities of using ozone for decontamination of air and surfaces not only by the bodies of integrated rescue system of the Czech Republic. | 0 / 0 | 0 / 0 | 2522 / 100 | 2522 / 100 | 0 / 0 |
| Ministry of the Interior | | 0 / 0 | 0 / 0 | 2522 / 100 | 2522 / 100 | 0 / 0 |
| TACR | Biofiltration Impregnated Composite Materials and Substrates | 0 / 0 | 794 / 31 | 854 / 34 | 854 / 34 | 794 / 31 |
| TACR | Reducing food chain and environment burden of residues from plant protection products in fruit growing | 0 / 0 | 915 / 36 | 1098 / 43 | 1098 / 43 | 1098 / 43 |
| TACR | Biorefinery Research Centre of Competence | 5626 / 222 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |

| | | | | | | |
|--------------|--|---------------------|---------------------|---------------------|---------------------|----------------------|
| TACR | Centre for Innovative Use and Strengthening of Competitiveness of Czech Brewery Raw Materials and Products | 1998 / 79 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Personalized Medicine – Diagnostics and Therapy | 2500 / 99 | 2500 / 99 | 1250 / 49 | 1250 / 49 | 0 / 0 |
| TACR | Processing of animal waste | 9346 / 369 | 4673 / 184 | 4557 / 180 | 2450 / 97 | 0 / 0 |
| TACR | Valorisation of plant biomass by biorefining processes | 10000 / 394 | 6826 / 269 | 5240 / 207 | 2800 / 110 | 0 / 0 |
| TACR | Degradation of pesticide residues by bacteria | 6200 / 245 | 3250 / 128 | 3287 / 130 | 1750 / 69 | 0 / 0 |
| TACR | Advanced methods of refining vegetable oils | 0 / 0 | 0 / 0 | 1260 / 50 | 2205 / 87 | 1080 / 43 |
| TACR | Bioactive substances from organically produced traditional Czech herbs and crops and development of nano-encapsulated forms for use in dermatology, cosmetics and immunity support | 0 / 0 | 0 / 0 | 2158 / 85 | 2158 / 85 | 2158 / 85 |
| TACR | System for streamlining plant production and microbiological processes | 0 / 0 | 0 / 0 | 828 / 33 | 920 / 36 | 828 / 33 |
| TACR | R&D technology for the production of protein concentrates from oilseed expellers | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1321 / 52 |
| TACR | Development of a receptor biochip for the control and regulation of steroid hormones | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2069 / 82 |
| TACR | Biorefining and circular economy for sustainability | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 13843 / 546 |
| TACR | Personalised Medicine: From Translational Research into Biomedical Applications | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1875 / 74 |
| TACR | REcombinant TEchnologies for MEDicine | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 7492 / 296 |
| TACR | | 35670 / 1407 | 18958 / 748 | 20532 / 810 | 15485 / 611 | 32558 / 1284 |
| TOTAL | | 78687 / 3104 | 57589 / 2272 | 54440 / 2148 | 57448 / 2266 | 113115 / 4462 |

Table 3.3.2 - Contract research activities

| Client ²⁵ | Activity name | Revenue (in thousands CZK/thousands EUR) | | | | |
|--|---|--|---------|----------|----------|--------|
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| ÚSTAV EXPERIMENTÁLNÍ MEDICÍNY | Comprehensive newborn study | 787/31 | 2385/94 | 2908/115 | 5414/214 | 16/1 |
| FRUTA PODIVÍN,A.S. | Accredited analyses, i.e. ML 3596-3602/1 and others | 1478/58 | 927/37 | 2252/89 | 555/22 | 451/18 |
| ARNIKA - PROGRAM TOX | Analyses of organic pollutants (PFAS and others) | 295/12 | 624/25 | 1243/49 | 847/33 | 521/21 |
| D-TEST | Accredited analyses, i.e. ML 1766-1776/21 | 932/37 | 455/18 | 628/25 | 810/32 | 627/25 |
| KOSTELECKÉ UZENINY A.S. | Food technology experiments | 1000/39 | 1000/39 | 1000/39 | 0/0 | 0/0 |
| AGRA GROUP A.S. | Analysis of wax esters | 37/1 | 710/28 | 961/38 | 620/24 | 497/20 |
| LABORATOŘ POSTOLOPRTY | Accredited analyses, i.e. ML 4081-4086/21 | 681/27 | 681/27 | 778/31 | 500/20 | 51/2 |
| ALS CZECH REPUBLIC, s.r.o. | Accredited analyses, i.e. ML 1483/22 KM 1 | 200/8 | 332/13 | 734/29 | 962/38 | 352/14 |
| OXALIS, SPOL. S R.O. | Accredited analyses, i.e. ML 2570-2572/21 | 589/23 | 489/19 | 471/19 | 631/25 | 392/15 |
| SLOVACKÁ FRUTA, A.S. | Accredited analyses, i.e. ML 22/19 KM 01 | 191/8 | 317/13 | 1533/60 | 209/8 | 203/8 |
| OLMA, A.S. | Food technology experiments | 1050/41 | 1000/39 | 0/0 | 0/0 | 0/0 |
| UZENINY PŘÍBRAM, A.S | Food technology experiments | 1000/39 | 0/0 | 1000/39 | 0/0 | 0/0 |
| PLZEŇSKÝ PRAZDROJ, A.S. | Fiber and carbonyl determinations | 265/10 | 262/10 | 262/10 | 540/21 | 460/18 |
| EUROFINS CZ S.R.O. | Various accredited analyses | 315/12 | 412/16 | 331/13 | 288/11 | 332/13 |
| STÁTNÍ ZEMĚDĚLSKÁ A POTRAVINÁŘSKÁ INSPEKCE Inspektorát v Praze | Various accredited analyses | 64/3 | 13/1 | 61/2 | 654/26 | 806/32 |
| ŠOTOLA MVDR. S.R.O. | Accredited analyses, i.e. ML 2884/22, ML | 309/12 | 206/8 | 274/11 | 405/16 | 396/16 |
| NATURAL PACK GROUP S.R.O. | Various accredited analyses | 89/3 | 330/13 | 411/16 | 299/12 | 434/17 |
| STÁTNÍ ZEMĚDĚLSKÁ A POTRAVINÁŘSKÁ INSPEKCE Inspektorát v Brně | Various accredited analyses | 242/10 | 216/9 | 285/11 | 427/17 | 342/14 |
| PENNY MARKET S.R.O. Petr Baudyš | Various accredited analyses | 679/27 | 378/15 | 315/12 | 0/0 | 0/0 |

²⁵ If the client is from abroad, indicate in brackets the country of origin of the client.

| | | | | | | |
|--|--|-------------------|-------------------|-------------------|-------------------|------------------|
| SEZNAM.CZ, A.S. | Microbiology determinations | 567/22 | 488/19 | 260/10 | 0/0 | 0/0 |
| STÁTNÍ ZEMĚDĚLSKÁ A POTRAVINÁŘSKÁ INSPEKCE Inspektorát v Hradci Králové | Various accredited analyses | 285/11 | 221/9 | 274/11 | 239/9 | 295/12 |
| STÁTNÍ ZEMĚDĚLSKÁ A POTRAVINÁŘSKÁ INSPEKCE Inspektorát v Olomouci | Various accredited analyses | 303/12 | 167/7 | 186/7 | 286/11 | 299/12 |
| ÚŘAD PRO TECH. NORMAL | Various accredited analyses | 322/13 | 248/10 | 215/8 | 198/8 | 215/8 |
| JOKEY PRAHA CZ, S.R.O. | Sensory analyses | 25/1 | 400/16 | 0/0 | 0/0 | 772/30 |
| ABCERT AG, ORGANIZACE | Various accredited analyses | 390/15 | 233/9 | 43/2 | 166/7 | 265/10 |
| LYCKEBY AMYLEX, A.S. | Polysaccharide determination | 1000/39 | 19/1 | 0/0 | 0/0 | 0/0 |
| ZZN JIHLAVA A.S. | Food technology experiments | 1010/40 | 0/0 | 0/0 | 0/0 | 0/0 |
| ADM PRAGUE S.R.O. | Determination of waxes | 143/6 | 265/10 | 238/9 | 200/8 | 157/6 |
| BLANICKÁ S.R.O. P. O. BOX 143 | Food technology experiments | 0/0 | 0/0 | 1000/39 | 0/0 | 0/0 |
| DELIMAX, A.S. | Food technology experiments | 1000/39 | 0/0 | 0/0 | 0/0 | 0/0 |
| KMOTR - MASNÁ VÝROBA KROMĚŘIŽ | Food technology experiments | 1000/39 | 0/0 | 0/0 | 0/0 | 0/0 |
| MIKROP CEBIN A.S. | Food technology experiments | 1000/39 | 0/0 | 0/0 | 0/0 | 0/0 |
| MRÁZ AGRO CZ, S.R.O. | Various accredited analyses | 0/0 | 0/0 | 1000/39 | 0/0 | 0/0 |
| NOVÉ VINAŘSTVÍ, A.S. | Technology experiments | 0/0 | 1000/39 | 0/0 | 0/0 | 0/0 |
| PIKA, A.S. | Food technology experiments | 0/0 | 1000/39 | 0/0 | 0/0 | 0/0 |
| RABBIT TRHOVÝ ŠTĚPÁNOV A.S. | Food technology experiments | 0/0 | 1000/39 | 0/0 | 0/0 | 0/0 |
| VODŇANSKÁ DRŮBEŽ, A.S. | Food technology experiments | 0/0 | 0/0 | 1000/39 | 0/0 | 0/0 |
| ZETEN SPOL. S R.O. | Food technology experiments | 0/0 | 1000/39 | 0/0 | 0/0 | 0/0 |
| Sum of others (< 1 000 thousands CZK / 39 thousands EUR) | Different types of analyses and contractual research activities (detailed list contains approx. 1 500 items) | 17654/696 | 15499/611 | 16449/649 | 12954/511 | 12833/506 |
| Total | | 34901/1377 | 32279/1273 | 36111/1424 | 27205/1073 | 20715/817 |

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁶, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

The FFBT research results with significant socio-economic impact in the 2019 – 2023 reporting period included patents (7), utility models (27), functional samples (23), prototypes (4), proven technologies (43), certified methodologies (25), software (2) and others. Some of them resulted from FFBT contract research projects summarized in 3.4.2.

1. P – Patent: Filtration equipment for filtering and stabilizing beer in one step

The author's collective: Lukáš Jelínek; Marcel Karabín; Pavel Dostálek

Result identification: RIV/60461373:22330/21:43923330|RIV22-TA0-22330___

FORD: 2.11 Other engineering and technologies (2.1101 Food and Beverages)

Link to project: TE02000177 Centre for Innovative Use and Strengthening of Competitiveness of Czech Brewery Raw Materials and Products

Description, positive impact on society, gender, sustainability:

In the brewing industry, almost all beer is treated with stabilization filtration, which extends its colloidal shelf-life. Silica gel is used in combination with diatomaceous earth (kieselguhr) for the adsorption removal of turbidity-forming proteins, while polyamides, mainly polyvinylpyrrolidone (PVPP), are the most commonly used for the adsorption removal of turbidity-forming polyphenols. Large breweries have mastered two-stage filtration, but for smaller breweries that want to export their beer, it is a large problem because their export volume is usually small, intermittent, and the purchase of a stabilization filter is not profitable. These shortcomings are addressed by the presented invention developed at the Department of Biotechnology (FFBT). Patent describes a unique technological solution improving the efficiency of the stabilization step, the aim of which is to extend the overall shelf-life of the beer. The main advantages of this device include simplicity, versatility and low purchase price, it brings significant savings in stabilizing agents and costs associated with their ecological disposal. The proposed solution can be applied to any existing diatomaceous earth filtration. The filtration device for the filtration and stabilization of beer in one step contains two continuous dispensers, a filter and a retention tank. In addition, the manufacturer achieves significant savings of PVPP. Thus, the overall filtration process is more eco-friendly and sustainable.

²⁶ See Terms definition.

2. P – Patent: Process for the production of polyhydroxyalkanoates from animal by-products

The author's collective: Petra Lovecká; Blanka Vrchotová; Kateřina Demnerová; Hana Stiborová; Petra Patáková; Barbora Branská; Zdeněk Jandejsek; Tomáš Fulín; Petr Kaštánek

Result identification: RIV/60461373:22330/21:43922215!RIV22-TA0-22330 ____

FORD: 2.9 Industrial biotechnology (2.0903 Bioproducts)

Link to project: TE01020080 Biorefinery Research Centre of Competence

Description, positive impact on society, gender, sustainability:

The present invention relates to a process for producing polyhydroxyalkanoates from animal by-products of protein nature, in particular feathers, fur and skin. The animal by-product of protein origin is subjected to alkaline hydrolysis and subsequently bacteria producing polyhydroxyalkanoates (PHA) are cultivated thereon in the presence of yeast metabolism products. The present invention therefore proposes co-cultivation of yeast and bacteria, or cultivation of bacteria in the presence of yeast extract, for the purpose of producing polyhydroxyalkanoates in a medium from animal by-products, in particular from alkaline hydrolysate of chicken feathers, without the addition of other nutrient sources. Within the framework of the present invention, it was found that the production of PHA is supported by the presence of yeast metabolites such as vitamins B₂, B₁₂, E, F, provitamin D₂, growth factors (proteins, purines, pyrimidines). Chicken feathers, a waste from poultry production, are considered a critical problem in many countries due to their limited applications and negative impact on the environment due to their landfilling. For easier utilization, chicken feathers are prepared into an alkaline hydrolysate, which is a protein source of carbon and also contains a significant amount of nitrogen in the form of amino acids, peptides and proteins.

The proposed process utilizes animal waste and can significantly contribute to the sustainability and the economy of poultry farms.

3. P – Patent: Imaging agents and methods

The author's collective: Král V., Havlík M., Kaplánek R., Bříza T., Kejík Z., Martásek P., Mikšátková L., Králová J., Ruml T., Rimpelová S.

Result identification: RIV/60461373:22330/19:43919265

FORD: 1.6 Biological sciences (10609 Biochemical research methods)

Link to project: TE01020028 Center for Development of Original Drugs

Description, positive impact on society, gender, sustainability:

FFBT researchers developed two-photon fluorescent dyes based on a gamma-substituted pentamethinium structural motif for multiphoton fluorescence microscopy for *in vivo* imaging. Excellent optical properties of these polymethinium salts are applicable not only for research purposes, but also in pharmaceutical industry and biomedicine, where deep tissue imaging in real-time is an inevitable tool.

The multiphoton fluorescence microscopy found invaluable application in physiology, neurobiology, and more recently, also in optical biopsies. In addition to deeper tissue penetration and lower

background than other fluorescence techniques, it also minimizes phototoxicity and photobleaching. However, the broader use of multiphoton microscopy has been significantly limited by the unsatisfactory properties of the commercially available two-photon probes. Our probes allowed imaging up to an exceptionally large tissue depth of about 160 μm in mouse podocytes as a model. In addition, both probes enabled long-term (> 6 h) continuous real-time monitoring of *in vivo* samples. Both two-photon probes outperformed the properties of one of the best commercially available fluorescent dyes, Alexa Fluor® 647. Thus, our two-photon dyes based on gamma-pentamethinium systems prepared from corresponding malondialdehydes are suitable for long-term deep-tissue imaging in living animals. These dyes could also serve as a general scaffold for modifications and development of further derivatives of two-photon dyes. The one-step synthesis makes from these salts strong, easily available and economically feasible tool for users who need excellent two-photon probes.

4. F – Utility model: Dietary supplement based on hop extract with a high content of 8-prenylnaringenin

The author's collective: Říha Jaroslav, Willimetz Robert, Zarevúcka Marie, Dostálek Pavel

Result identification: RIV/60461373:22330/20:43921079!RIV21-TA0-22330

FORD: 2.11 Other engineering and technologies (2.1101 Food and Beverages)

Link to project: TE02000177 Centre for Innovative Use and Strengthening of Competitiveness of Czech Brewery Raw Materials and Products

Description, positive impact on society, gender, sustainability:

Hops contain active substances that are able to bind to estrogen receptors and alleviate the symptoms of menopause. These effects are mainly exhibited by 8-prenylnaringenin (8-PN), which belongs to the prenylated flavonoids and is the strongest substance with estrogenic effects discovered in nature. Hops (*Humulus lupulus* L.) are the only known source of 8-PN, but the overall amount of 8-PN and its precursors are very low in most hop varieties. For this reason, the Hop Research Institute Co., Ltd. bred a very unique variety, Vital, which has a high content of 8-PN and its precursor, and used harvesting and storage technologies that preserve these substances in hop cones. Next, researchers from FFBT (Department of Biotechnology) successfully invented a method for the catalytic transformation of precursors into 8-PN along with the production of hop extract rich in desired compound. Further interdisciplinary cooperation of FFBT experts with R&D unit of the Biomedica company provided a dietary supplement in the form of tablets (MenoPrima Bella®) with extraordinary content of 8-PN accompanied by other natural substances that help women with other symptoms of menopause and began to produce this natural remedy (<https://www.bio-medica.cz/menoprime-bella-120-tbl>).

The R&D&I of the presented food supplement commercialized as MenoPrima Bella® was supported by the Technology Agency of the Czech Republic and it is an excellent example of cooperation between the FFBT, public research institution (Hop Research Institute Co., Ltd. in Žatec) and Biomedica company.

5. F – Utility model: Pasta-filata cheese modified with microbial transglutaminase

The author's collective: Štětina Jiří, Šlégr Jan, Čurda Ladislav, Macůrková Anna, Marhons Štěpán, Hyršlová Ivana

Result identification: RIV/60461373:22330/23:43928344

FORD: 2.11 Other engineering and technologies (2.1101 Food and Beverages)

Link to project: QK1910024 Utilization of enzyme and probiotics potential of micro-organisms to develop new and improve the quality and durability of existing dairy and bakery products

Description, positive impact on society, gender, sustainability:

Important sensory and quality attribute of pasta-filata cheeses is the texture, which is characterized by an anisotropic fibrous structure. The residual activity of the enzymatic system of milk and lactic acid bacteria causes a loss of firmness and the desired structure of the cheese even at storage temperatures of 2 to 8 °C. These changes are the cause of undesirable sensory defects in the texture, limit the shelf-life and marketability of final products. FFBT experts (Department of Fat, Dairy, Cosmetics) investigated the commercial use of microbial transglutaminase (protein-glutamine gamma-glutamyltransferase, EC 2.3.2.13), which modified milk proteins by forming new inter- and intramolecular isopeptide bonds. This allowed the improvement of the texture of cheeses and the increase of the overall yield of the process by reducing protein losses to whey. Technological application of microbial transglutaminase was successfully verified during the production of pasta-filata-type cheese (Kashkaval). The result of a series of industrial experiments proved that the production of pasta-filata cheese in the company Mlékárna Olešnice a.s. met all requirements. In addition, desired physicochemical parameters of Kashkaval were achieved, and the stability of their texture during storage was significantly improved. The application of microbial transglutaminase at a dose of 30 U/L improved the milk yield by 3%. For commercial producers, it brings additional economic benefits and less waste (whey). It is therefore a more sustainable technology.

6. F – Utility model: Herbal preparation to increase the resistance of vines to fungal diseases

The author's collective: Jarošová (Kolouchová) Irena, Mařátková Olga, Gharwalová Lucia, Minařík Miroslav, Paulíček Vít, Michlovský Miloř, řnajdárezek Ladislav

Result identification: RIV/60461373:22330/22:43923852!RIV23-TA0-22330

FORD: 2.9 Industrial biotechnology (20901 Industrial biotechnology)

Link to project: TH03030271 Wine products with added value

Description, positive impact on society, gender, sustainability:

Presented technical solution was based on the application of herbal preparation (grape stems, *Urtica dioica*) against fungal diseases in order to increase the resistance of grapes. Currently, secondary products from wine production are not used despite their extraordinary content of bioactive compounds and antioxidants. Application of such preparations enhanced the defense mechanisms of plants against the ever-increasing pressure of fungal diseases. They cause large losses in the yield of grapes, in the order of tens of percent, due to climate change.

Commercial users of developed utility model are companies EPS s.r.o. and Vinselekt Michlovský a.s.. FFBT experiments clearly confirmed the suppression of fungal diseases in the range of 10 - 30%. Implemented improvement increased the yield of grapes and the production of final wine by 5 - 15%. The average yield of grapes is around 5 t/ha. Organic grapes (wines) account for 4% of the overall production in the Czech Republic. When producing 600 L of wine from 1 t of grapes, a producer will

produce 3,000 L of wine from 1 ha. If the yield increases by 10%, the producer will produce 300 L of wine/ha more. Current users of the developed product are small and medium-sized winemakers in conventional, but especially organic, agriculture.

7. N – Certified methodology: Metabolic fingerprinting-based multiclass strategy for varietal authentication of wine using advanced data mining and chemometric tools

The author's collective: Bechyňská Kamila, Džuman Zbyněk, Ehlers M., Fauhl-Hassek C., Hajšlová Jana, Uttl Leoš, Kadlec Václav

Result identification: RIV/60461373:22330/21:43922876 - isvavai.cz

FORD: 1.4 Chemical sciences (10406 Analytical chemistry)

Link to project: LM2018100 Infrastructure for Promoting Metrology in Food and Nutrition in the Czech Republic (METROFOOD-CZ)

Description, positive impact on society, gender, sustainability:

One of the major challenges in wine analysis is authentication of original grape. Authors developed and validated an authentication method based on direct metabolomic fingerprinting of wine using UHPLC-Q-Orbitrap™-HRMS. In total, 101 red wine and 97 white wine samples (five varieties each group) were analysed within certified methodology. After the data mining and data pre-treatment steps, principal component analysis (PCA) was used to explore the data structure. Since the obtained unsupervised PCA models revealed a notable clustering according to the grape varieties, orthogonal partial least squares discriminant analysis (OPLS-DA) was used to create supervised binary models. From over 85 000 models calculated, final models with the highest prediction abilities were chosen, validated and arranged into a Rooted Binary Decision Directed Acyclic Graph (RBDDAG), which was used for wine authentication. In case of white wine varieties, over 96 % of samples in negative ionization mode (ESI-) and over 95 % of samples in positive ionization mode (ESI+) were correctly classified. In case of red wines, over 95 % of samples in ESI+ and over 94 % of samples in ESI- were correctly classified.

Developed method is suitable for official control purposes (i.e. Czech Agriculture and Food Inspection Authority). The analytical strategy described in the methodology and their presentation at an international forum led to the establishment of cooperation with the German Federal Institute for Risk Assessment (BfR) in Berlin.

8. N – Certified methodology: Determination of selected phytocannabinoids in oil matrix

The author's collective: Nemeškalová Alžběta, Kuchař Martin

Result identification: RIV/00023752:____/20:43920335 RIV/60461373:22340/20:43921003
RIV/60461373:22810/20:43921003

FORD: 1.4 Chemical sciences (10406 Analytical chemistry)

Link to project: LO1611: Sustainability for the National Institute of Mental Health

Description, positive impact on society, gender, sustainability:

Methodology is intended for the determination of selected phytocannabinoids in oil samples used for food purposes and as dietary supplements. This involves the determination of cannabidiol, tetrahydrocannabinol, cannabidiolic acid, tetrahydrocannabinolic acid, cannabigerol, cannabigerolic

acid, cannabidivarin and cannabitol. The certified methodology describes the development, optimization and validation of the analytical determination of the content of significant cannabinoids in commercial oil samples. The developed analytical method is based on a unique combination of UHPLC-UV-MS/MS for the determination of cannabinoids in oils. Within the framework of a single chromatographic analysis, a high content of CBD and an order of magnitude lower content of THC and other cannabinoids can be determined.

The user of the certified methodology is the Department of Technical and Natural Science Investigations at the Criminalistics Institute of the Czech Republic. It is also practically used and further developed in the laboratory of Forensic Analysis of Biologically Active Substances at the UCT Prague. Due to the change in legislation, the amendment to the Act on Addictive Substances 167/1998 Coll., which introduces a new category of psychomodulatory substances, increased interest in the determination of cannabis products with a low content of THC and, conversely, a high content of other cannabinoids can be expected.

9. Z – Proven technology: Direct processing of lignocellulosic hydrolyzates difficult to ferment into biobutanol by fed-batch cultivation

The author's collective: Branská Barbora, Drahokoupil Marek, Melzoch Karel, Patáková Petra

Result identification: RIV/60461373:22330/19:43918377 - isvavai.cz

FORD: 2.9 Industrial biotechnology (2.0903 Bioproducts)

Link to project: LTACH17006 Production of biobutanol and succinic/lactic acid from lignocellulose biomass

Description, positive impact on society, gender, sustainability:

The principle of the proposed technology is based on the sequential feeding of a medium prepared by hydrolysis of lignocellulosic biomass (i.e. straw, wooden chips) without the inclusion of washing and detoxification steps, consequently, such medium is difficult to ferment. Suggested strategy benefits from several factors: i) the toxic hydrolyzate is dosed to a physiological culture with the lowest susceptibility to increased salinity, ii) the salt concentration increases gradually, allowing bacteria to adapt, and iii) eliminating the interaction of the toxic effects of lignocellulose inhibitors and increased salinity due to biotransformation of phenolic compounds by actively growing culture.

The proven technology for direct processing of difficult-to-ferment hydrolysates addresses the higher toxicity of the raw material through a strategy of gradual dosing of the medium in the phase of the growth cycle, when production microorganisms are most resistant to the effects of antimicrobial compounds, salts and inhibitors. The proven technology allows for the omission of the economically costly detoxification or washing step in the technological scheme for processing lignocellulosic biomass used in the fermentation production of biofuels and solvents. Project preparation must precede implementation.

A contract on the use of R&D&I results was concluded between UCT Prague and the company Dekonta, a.s.. The result includes a protocol for verification by an independent assessor.

10. Z – Proven technology: Development and innovation in the production of vegetable spreads and legumes salads

The author's collective: Ševčík Rudolf; Pohůnek Václav; Rajchl Aleš; Urbančíková Zdeňka; Kvasnička František; Horsáková Iveta

Result identification: RIV/60461373:22330/19:43919728 - isvavai.cz

FORD: 2.4. Chemical engineering (20401 - Chemical engineering (plants, products))

Link to project: Innovation project of the Ministry of Agriculture (Support for Rural Development) with registration number 15/001/16220/564/000007

Description, positive impact on society, gender, sustainability:

DELIMAX a.s. has developed new products within the framework of proven technology, which are vegetable spreads and salads based on legumes. The development of new technological processes, recipes and investments in new technology have enabled the production and manufacture of new products such as legume based spreads (chickpea spreads) and salads (bean salads). The innovativeness of the project consisted not only in the development and introduction of production of a series of completely new products, but also in the related development of new recipes, technological processes and procedures for assessing the food safety of final products. The newly developed spreads and salads are packaged so that they can be offered both to small consumers in retail stores and in larger packages for catering establishments and wholesalers. New technologies, technological processes and allergen control procedures at DELIMAX a.s. enable the reduction of the risk of cross-contamination associated with the processing of sesame and other allergens.

A cooperation agreement on the project "Development and innovation in the production of vegetable spreads and salads based on legumes" was concluded between the UCT Prague and Delimax, a.s. The research report itself is subject to trade secrets.

Table 3.4.1 - Overview of research results in the period under evaluation

| Type of result ²⁷ | Year of application | Name |
|------------------------------|---------------------|---|
| Patent | 2021 | Filtration equipment for filtering and stabilizing beer in one step |
| Patent | 2021 | Process for the production of polyhydroxyalkanoates from animal by-products |
| Patent | 2019 | Imaging agents and methods |
| Utility model | 2020 | Dietary supplement based on hop extract with a high content of 8-prenylnaringenin |
| Utility model | 2023 | Pasta-filata cheese modified with microbial transglutaminase |
| Utility model | 2022 | Herbal preparation to increase the resistance of vines to fungal diseases |
| Certified methodology | 2021 | Metabolic fingerprinting-based multiclass strategy for varietal authentication of wine using advanced data mining and chemometric tools |
| Certified methodology | 2020 | Determination of selected phytocannabinoids in oil matrix |
| Proven technology | 2019 | Direct processing of lignocellulosic hydrolyzates difficult to ferment into biobutanol by fed-batch cultivation |
| Proven technology | 2019 | Proven technology: Development and innovation in the production of vegetable spreads and legumes salads |

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)²⁸, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).²⁹

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

²⁷ Specify the specific type of result. Add rows as needed.

²⁸ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

²⁹ If the commercialisation of R&D&I results is carried out in this way.

Self-assessment:

The Rector's Office for Research and Technology Transfer (R&TTO) is centrally established at UCT Prague and provides support in the field of intellectual property protection, commercialization and transfer of the results generated at UCT Prague. In this area, the R&TTO cooperates with the vice-deans of individual faculties and individual heads of research groups.

If a result with application potential is identified, the R&TTO provides an assessment of the technology, including a preliminary patent search and a basic analysis of the market potential. The R&TTO then recommends an IP protection strategy and a strategy for exploitation (further development, licensing, sale or establishment of a spin-off company).

An important part of the commercialization is carried out in the form of obtaining contracts from industrial partners on the basis of know-how and results generated at the faculty.

1. F – Utility model: Dietary supplement based on hop extract with a high content of 8-prenylnaringenin (technical details can be found in section 3.4/item No. 4)

The author's collective: Říha Jaroslav, Willimetz Robert, Zarevúcka Marie, Dostálek Pavel

Result identification: RIV/60461373:22330/20:43921079!RIV21-TA0-22330

FFBT employees, together with the R&D unit of Biomedica Company, formulated tablets rich in phytoestrogen 8-prenylnaringenin and other synergistic natural substances that help women with menopausal symptoms. Biomedica has successfully started production of the natural remedy MenoPrima Bella® (<https://www.bio-medica.cz/menoprima-bella-120-tbl>).

Before starting its own production, a strong cooperation agreement, a license agreement, and also the necessary agreement for the use of the UCT Prague logo on the product packaging were concluded in close cooperation with our R&TTO unit. License fees have been paid since January 1, 2020. According to Biomedica statement, approximately 5,000 units of the product were sold until now, which at an average price of CZK 200/unit made a turnover of approximately CZK 1 million and approximately CZK 70,000 in license fees for UCT Prague (CZK 13 000 until 2023). Interest in MenoPrima Bella® is rising steeply; production expansion and necessary investments in technology are planned. This is a prime example of the cooperation of our Faculty with the commercial sector.

2. F – Utility model: Pasta-filata cheese modified with microbial transglutaminase (technical details can be found in section 3.4/item No. 5)

The author's collective: Štětina Jiří, Šlégr Jan, Čurda Ladislav, Macůrková Anna, Marhons Štěpán, Hyršlová Ivana

Result identification: RIV/60461373:22330/23:43928344

The R&D technology of pasta-filata cheese modified with microbial transglutaminase was supported by the National Agency for Agricultural Research. In cooperation with the commercial company Mlékárna Olešnice a.s., the application of transglutaminase in the production of pasta-filata cheeses was designed and verified. Developed innovation improved the milk yield by 3%, which means additional economic benefits and lower volume of waste whey for the manufacturer.

Based on the achieved results, an agreement was concluded on the transfer and the use of the project results, according to which Mlékárna Olešnice a.s. was provided with a non-exclusive license

for the pasta-filata cheese product. Company is highly interested in the application of innovative cheese production, given that the implementation of the production has already been included in the production plan for the years 2024-2029. The expected production volume in the years 2024 to 2029 is 5,000 kg of cheese per year, which represents an annual turnover of approximately CZK 1,200,000.

3. F – Utility model: Herbal preparation to increase the resistance of vines to fungal diseases
(technical details can be found in section 3.4/item No. 6)

The author's collective: Jarošová (Kolouchová) Irena, Mařátková Olga, Gharwalová Lucia, Minařík Miroslav, Paulíček Vít, Michlovský Miloš, Šnajdárek Ladislav

Result identification: RIV/60461373:22330/22:43923852!RIV23-TA0-22330

Presented technical solution was based on the application of herbal preparation (grape stems, *Urtica dioica*) against fungal diseases in order to increase the resistance of grapes. Commercial users of developed utility model are companies EPS s.r.o. and Vinselekt Michlovský a.s..

Implemented improvement increased the yield of grapes and the production of final wine by approx. 10%. It means 300 L of wine/hectare more. At the average production price of wine, the gross profit is 55 CZK/0.75 L of wine. This means that the winemaker will earn 22,000 CZK more from 1 hectare. The price of the herbal preparation is calculated at approximately 200 CZK/L, with the recommended dosage of 8 L per 400 L of water per 1 hectare and 5 sprays during vegetation growth. This is a cost of 8,000 CZK per 1 hectare. The gross profit from the sale of quality wine after deducting the price of the product is therefore 14,000 CZK/hectare.

4. Z – Proven technology: Development and innovation in the production of vegetable spreads and legumes salads (technical details can be found in section 3.4/item No. 10)

The author's collective: Ševčík Rudolf; Pohůnek Václav; Rajchl Aleš; Urbančíková Zdeňka; Kvasnička František; Horsáková Iveta

Result identification: RIV/60461373:22330/19:43919728 - isvavai.cz

As part of the innovation project, vegetable spreads made from chickpeas, hummus (such as hummus with cumin, hummus with garlic, hummus with Kalamata olives, hummus with chili, hummus with dried tomatoes and basil, hummus with beetroot) and vegetable salads (such as lentil salad, chickpea salad with dried tomatoes, bean salad) were developed.

The cooperation agreement on the project "Development and innovation in the production of vegetable spreads and salads based on legumes" was concluded between the UCT Prague and Delimax, a.s.. The research report itself is subject to commercial confidentiality.

According to information from DELIMAX a.s., in 2023, approximately 13 million pieces of vegetable spreads weighing 160 g - 250 g were sold with a total market value of more than 215 million CZK. According to the statement of DELIMAX a.s. The interest in vegetable spreads is constantly increasing. An example is the submission of another project by Delimax, a.s. and the approval of the Application for a subsidy within the 1st round of the Strategic Plan.

5. EIT Food Hub, 2018-2025

<https://eitfoodhub.vscht.cz>

Coordinator of activities: Monika Tomaniová

EIT Food is one of Europe’s largest food initiatives, working to make the food system more sustainable, healthier, and more transparent. It connects academic, research, and industrial sectors, fosters knowledge transfer, and encourages innovative entrepreneurship to accelerate innovation, create jobs, strengthen business positions, and enhance competitiveness. In the Czech Republic, EIT Food is represented by the [EIT Food Hub](#), founded in 2018 at FFBT, which promotes local innovation ecosystems and implements EIT Food and Regional Innovation Scheme (RIS) programs. These initiatives focus on four pillars: education, innovation, entrepreneurship, and public engagement. Since the launch of the EIT Food Hub in the Czech Republic, the Hub has organized various activities and competitions for students, entrepreneurs, innovators, and startups at different development stages, involving hundreds of participants. This helps cultivate an environment that fosters innovative thinking and equips entrepreneurs with essential skills for driving innovations toward commercialization. In addition, associated [DETECT!](#) project, funded from 2023 to 2024 under the EIT HEI scheme, supported deep tech talents with creative, innovative mindsets by developing their entrepreneurial skills and translating their knowledge into valuable products. As part of its cooperation with the state administration, the Hub aims to strengthen the agri-food sector in RIS3 to ensure greater integration of these topics into R&D&I programs. EIT Food Hub this boosts collaboration across science, industry, and institutions.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

| Type of revenue | Revenue (in thousands CZK/EUR) | | | | |
|--|--------------------------------|---------------------|---------------------|---------------------|---------------------|
| | 2019 | 2020 | 2021 | 2022 | 2023 |
| Biomedica – licence fee | 0/0 | 0/0 | 0/0 | 3 / 0,12 | 10 / 0,4 |
| Donations to support research and scientific activities of students (in total) | 307 / 12 | 483 / 19 | 436 / 17 | 464 / 18 | 375 / 15 |
| | | | | | |
| Total | 307 / 12 | 483 / 19 | 436 / 17 | 467 / 19 | 385 / 16 |

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

This is an important activity of UCT. FFBT staff and students participate in regular university-wide activities: Summer School, Science Festival, Youth Academy, European Science Night. We also offer activities encouraging our students' interest in R&D&I: "Contact", an event introducing enterprises to students as potential employers, often through Alumni. At Student Scientific Conferences, students present their projects to the industry. The best works are rewarded both by industry and scientific organisations. Appearances of scientists in traditional media and on social networks are supported by the UCT Communication Department. The following table lists the 10 most significant activities in the area in which FFBT is heavily involved:

1) Summer school for high school teachers and high school students (2019 – 2023)

The Summer school Chemistry for Life is organized annually by the University of Chemistry and Technology Prague for high school chemistry teachers and their students. Over the course of three days, 12-15 professional lectures from various areas of chemistry (biochemistry, food chemistry, materials chemistry, chemistry in pharmacy and environmental protection) are presented. Participants can visit the laboratories of the University of Chemistry and Technology, where they can try out simple experiments that can then be prepared for students at their high schools. Participation in the Summer School ranges from 110-130 teachers and 120-140 students.

2) CARBONCAST (2021 – 2023)

CarbonCast is the official university podcast of the UCT Prague, featuring interviews with distinguished individuals affiliated with the institution. The podcast explores topics ranging from science and research to university life and experiences beyond academia. Guests include academics, staff, students, and accomplished alumni.

More details: <https://creators.spotify.com/pod/show/carboncast0>

3) ScienceFest (2019 – 2023)

VědaFest (ScienceFest) is the largest open-air science outreach event in Czechia, held annually in the Dejvice district. The festival provides visitors with the opportunity to engage with the latest scientific discoveries through interactive exhibitions, hands-on experiments, and expert lectures. The Faculty of Food and Biochemical Technology (FFBT) is one of the principal organisers of the event and plays a key role in its regular programming.

4) Open Days at UCT Prague (DOD, 2019 – 2023)

The Open Days at UCT Prague are unique events designed for prospective students, offering them detailed insights into study programs at our university. Those interested can explore the university's facilities and laboratories, where an interactive and educational program is prepared, allowing them to meet academic staff as well as current students. The Faculty of Food and Biochemical Technology (FFBT) actively co-organizes these Open Days. Additionally, our faculty is an active participant in the Open University program, where prospective students can experience life at UCT by accompanying one of our current students. This includes visiting the campus, attending lectures, and observing laboratory work.

5) Youth Academy (UCT Prague +DDM Prague) (2019 – 2023)

Organization of popularization lectures for secondary school students, 2019 - 2023 Lecturers from all over UCT with a focus on lecturers who can captivate talented but still lay listeners with their speech.

6) University choir ChemChór, (2019 – 2023)

Singing in and leading a university choir supports the creativity of students and staff, facilitates new contacts and helps to connect study and work with everyday life. The ChemChór represents not only the faculty but also the entire university at public concerts and informal musical performances that are open to the general public.

More details: <https://aktivni.vscht.cz/clubs/culture/chemchor>

7) Zvědaví - audiovizuální profily (2022 - 2023)

The #Zvědaví project showcases a group of young individuals who have embarked on their scientific and technological journeys at UCT Prague. Through a series of audiovisual portraits, it documents their unique life paths driven by a desire to understand the world through the natural sciences. Members of the The Faculty of Food and Biochemical Technology (FFBT) are an integral part of the project.

8) Secondary school professional activities (2019 –2023)

Secondary school professional is a competition of talented high school students in solving professional problems. It usually takes place in three rounds in the form of competition shows, in which the competitors defend their works. The most successful solvers are often selected to participate in similar international competitions. Full-time high school students can participate in the competition.

Secondary school professional activity is a voluntary hobby activity of students of all types of secondary schools, which they carry out in their schools, extracurricular facilities, clubs. The result is an independently developed work or teaching aid, which is submitted for professional assessment and is subsequently defended before a professional jury. The aim of the competition is to help find talented students, guide them to an independent and creative approach, support them and professionally develop their growth. Students have the opportunity to participate in professional activities that will deepen and improve their knowledge in an interesting and practical way.

9) University of the 3rd Age (U3V, 2019 – 2023)

The University of the Third Age (U3V) is one of the forms of lifelong learning that the University of Chemical Technology in Prague (UCT Prague) implements as a member of the Association of Universities of the Third Age. The aim of the courses is to provide seniors with the opportunity to systematically familiarize themselves with the latest knowledge in the areas taught at the University of Chemical Technology in a qualified manner and at a university level. The organization of U3V courses is the basis for the continuous mental development of citizens of post-productive age, who not only expand their knowledge, but above all stimulate their interest in current events, the practical use of acquired knowledge and a constant active approach to life.

10) Researchers' Night (2019 –2023)

The Researchers' Night is an event in which UCT Prague traditionally participates. It allows visitors to look into university premises and laboratories, where they get acquainted with the environment where chemical experiments and other activities are carried out, and which are related to a certain theme of the Researchers' Night. This theme changes from year to year. In the Czech Republic, the Researchers' Night has been held since 2005 and is represented by Czech universities, scientific institutes, observatories and other institutions. FFBT traditionally participates in this event with activities related to the popularization of topics associated with the food and natural sciences.

More details: <https://www.nocvedcu.cz/en>

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

The Faculty was rated very positively in the last evaluation process and achieved an overall score of 4.8 out of 5. The evaluation panel found no major deficiencies and only made a few recommendations. All these suggestions for the improvement of our work have been carefully addressed by the Faculty management, and this feedback is very much appreciated. All the recommendations were further consulted with the International Advisory Board (IAB), which has been set up at our university.

Recommendations (R):

R1: Developing a robust and effective sabbatical policy for staff at all stages of their careers

The Faculty management is fully aware of the importance of international experience in the personal growth of academic staff. Sabbatical is anchored at UCT Prague in Directive A/S/961/14/2018, unfortunately, this tool is still rarely used by FFBT. However, only a few employees used the sabbatical during the period under review. The Erasmus staff mobility is used more for internships abroad. The situation with internships is significantly better for younger staff in postdoc positions. The willingness of PhD students to undertake internships is much better, and the FFBT now supports them with a special scholarship for internships abroad. However, the Faculty management is also aware that for many employees (especially those caring for young children, etc.), it is difficult to combine family responsibilities and a foreign internship, so the FFBT approaches the request for internships sensitively and individually.

R2: Exploring further incentives (both financial and non-financial) to encourage more extensive involvement of staff in industrially sponsored consultancies, spin-offs and commercialization of research

The Faculty has always had a very high standard of cooperation with industry. This cooperation was largely affected by the covid-19 pandemic, but gradually, the cooperation is improving again. The financial support of the staff in this area is based on a share of the profits generated by the collaboration with industry. A further incentive for FFBT staff is the requirement by national and international funders for the mandatory involvement of manufacturing companies and firms in projects. A non-financial motivation is the use of these activities in career advancement, where technical and implementation activities are one of the criteria evaluated in habilitation and appointment procedures at our Faculty. In general, the Faculty fully supports cooperation with industry and is aware that this is an existential necessity for a technology-oriented university. The Faculty, in cooperation with the Research and Technology Transfer Office, intensively supports the implementation activities in the Proof-of-Concept phase, when the grant support has been terminated, but the results of applied research have considerable market potential (prototype development, testing, demonstration in a real environment or up-scale). Our Faculty is not yet successful in creating spin-off companies, and more attention should be paid to this area. At the university level, technical

and legal support of spin-offs is provided through the Technology Transfer Unit. Commercialization is successful only for selected scientific outputs, and the Faculty sees room for improvement.

R3: strengthening the research environment by continuously developing the opportunities for researchers at all stages of their careers to meet and present the results of their research.

The research environment at our Faculty is continuously given great attention. Publication activity is regularly and carefully monitored. Considering the size of our Faculty and the largely family-oriented environment, awareness of research activities of other Departments/working groups across the Faculty is very good. Numerous seminars, workshops, and other activities are advertised throughout the Faculty and college. Evidence of a good research environment is very frequent interdisciplinary collaboration across institutes and working groups - as evidenced by numerous joint publications, grant proposals, and joint implementation activities.

R4 strengthening the communication of the Faculty in external forums (media and social networks)

Communication of the research areas of our Faculty and other professional activities of the Faculty in the media and on social networks has recently received increased attention. For this purpose, the FFBT has developed a communication and popularisation strategy. The Faculty is continuously working on improving its media image, and there is an intensive cooperation with the University's Department of Communication. A Working group (representatives of all Departments) has been formed at the Faculty to address communication on social media and websites to the general public. The Faculty is also involved in science popularization events for the public. A new website with a completely new design and user-friendly for mobile devices is about to be launched. Social media posts are being uploaded regularly, and a new graphic design of the Faculty for social media has been prepared.

R5 increasing foreign students in English study programs of the Faculty

Based on this recommendation, the Faculty also made partial changes in the English study programs and paid increased attention to their advertising. Due to the persistently low interest in the Faculty's Bachelor's degree programme, and therefore very low teaching effectiveness, it was finally decided to create one over all-university Bachelor's degree programme, which is currently being prepared for accreditation. Following this new programme, the Faculty has prepared a completely new Master's programme called Applied Live Sciences, which will not only differ from the existing one in name but will be completely innovative, modern, and more attractive for foreign students.

R6 exceptionally, the number of male members should be increased in order to maintain gender balance

Gender issues at our Faculty are primarily addressed by eliminating factors that could discriminate against any group of people, and the Faculty strictly ensures equality of all staff. Gender balance is generally very good at our Faculty. There is a balanced ratio of men and women in the management of the Faculty (men/women: 2/2) and the heads of the departments (4/3), and there are no major gender imbalances among the staff of the individual institutes.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

| Document name | No. criteria | Location (link in HTML) |
|---------------------------|--------------|---|
| Spotify CarboCast | 3.6 | https://creators.spotify.com/pod/show/carboncast0 |
| University choir ChemChór | 3.6 | https://aktivni.vscht.cz/clubs/culture/chemchor |
| Researchers' Night | 3.6 | https://www.nocvedcu.cz/en |

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED: Faculty of Environmental Technology (FET)

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

The Faculty of Environmental Technology (FET) consists of five departments, namely:

- Department of Sustainable Fuels and Green Chemistry
- Department of Water Technology and Environmental Engineering
- Department of Power Engineering
- Department of Environmental Chemistry
- Department of Sustainable and Product Ecology

At the end of the monitoring period the numbers of students were as follows: 122 in bachelor's programs, 172 in follow-up master's programs, and a total of 294 students in undergraduate studies. The total number of doctoral students at the end of 2023 was 112. The total number of employees was converted to FTE and is shown in the following table (Table 3.1.1).

FET offers 4 bachelor's, 5 master's and 2 doctoral study programmes, as well as 2 international master's study programmes and one double degree doctoral study program, each provided jointly with European universities.

The FET strategy responds to current societal challenges in the field of fuel and environmental technologies by formulating study and research programs based on cooperation between institutions and organizations in chemical and technological fields.

The mission of FET is to contribute to the expansion of knowledge through its creative activities and to strive for the practical application of new knowledge and its use in the development of society.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

Vision:

- FET is an independent scientific research unit of European dimension consistently fulfilling its mission in the strategic areas of its scientific research activities.
- FET is a respected partner within the national and international research space.
- FET is a clearly profiled scientific research unit in areas where it achieves high-quality results on a national and international scale.
- FET has stable R&D funding, stable research teams, a workplace in demand by doctoral students and researchers from other R&D workplaces in the Czech Republic and abroad.
- Research programs are a platform for cooperation between FET workplaces, planning of human and financial resources.
- FET develops its research programs and thus improves the quality of educational activities within the implemented study programs.
- FET cooperates in science and research with other UCT Prague faculties.

Mission:

- Research at FET is a key factor in the development of study programs.
- Research activities are an integral part and a significant activity of academic staff. FET supports and motivates its academic and research staff in their scientific research activities.
- FET is working on its good reputation in the field of science and research among the professional community. It publishes the results of its scientific and research activities in respected periodicals and book publishers. It presents the results of science and research at international conferences.
- FET pays attention to the sustainability of human resources, prepares and motivates its doctoral students for a career as an academic/researcher.

FET is a research-oriented faculty with a focus on applied research. Scientific and research activities at FET focus on the areas of sustainable economy, fuel processing, water management, environmental protection technologies and innovative industrial technologies. The following hot topics were studied during the period of 2019-2023:

- Ecotoxicology and environmental microbiology
- Innovative remediation technology
- Life Cycle Assessment (LCA)
- Circular economy
- Energy efficiency of water and wastewater treatment technologies
- Wastewater-based-epidemiology
- Microbiological control of drinking water quality
- Micropollutants in the environment, their determination and removal technologies
- Digitization of water management
- Ion exchange and membrane separation methods
- Materials for energy and the study of corrosion behaviour of metals
- Green chemistry and catalysts for more efficient biomass utilization
- Energy and material utilization of biomass, alternative fuels and waste
- Thermochemical processes – pyrolysis and gasification
- Liquid alternative fuels and biofuels
- Thermochemical recycling of waste plastics
- Transportation, distribution and processing of natural gas and oil
- Air protection and waste gas treatment technology
- Carbon dioxide reduction and capture technology

- Alternative energy sources, energy storage

FET scientific activities bring benefits in terms of knowledge including original scientific research, publication of scholarly articles, monographs and textbooks, presentation of the results of scientific and research activities at national and international conferences, organisation of expert conferences, seminars and workshops with participation of students of the evaluated unit. Drawing up of expert reports for use in court disputes and creation of standards can be included among the key benefits the unit provides to society. Members of the staff also appear in the media. The number of successful grant applications and co-operation with the application sphere (industry) clearly demonstrate that the unit brings financial profit as well.

Cooperation with Czech and foreign industries take place both in the form of joint projects and contractual research. In addition, this cooperation paves the way for the education of scientists, researchers and technicians needed in industry. Thanks to this, applied research carried out at FET brings new knowledge, but also finances and is beneficial for the society.

Table 3.1.1 - Staffing per FTE²

| Academic/ Professional position | Total / Of which women | | | | | |
|--|------------------------|-------------|-------------|-------------|---------------|----------------|
| | 2019 | 2020 | 2021 | 2022 | 2023 | Total |
| Professor | 5,4 / 0,4 | 5,5 / 0,5 | 5,3 / 0,5 | 5,2 / 0,5 | 5,8 / 0,35 | 27,2 / 2,25 |
| Associate Professor | 15 / 2,3 | 15,1 / 2,3 | 14,7 / 2,2 | 13,6 / 2,3 | 12 / 2 | 70,4 / 11,1 |
| Assistant Professor | 36,1 / 13,9 | 35,2 / 13,5 | 35,3 / 13,8 | 37 / 15 | 40,9 / 16,6 | 184,5 / 72,8 |
| Assistant | 5,2 / 3 | 5,1 / 3,1 | 4,5 / 2,5 | 4,4 / 2,4 | 4,9 / 3 | 24,1 / 14 |
| R&D Personnel ³ | 27,8 / 16,4 | 27,6 / 13,3 | 28,5 / 14,9 | 31,5 / 15,5 | 29,4 / 15,5 | 144,8 / 75,6 |
| Researchers in other categories ⁴ | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Technical and economic staff ⁵ | 9,1 / 7,7 | 8,4 / 7 | 8,4 / 7 | 8,1 / 6,7 | 7,6 / 6,3 | 41,6 / 34,7 |
| Scientific, research and development staff involved in teaching activities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Early career researchers ⁶ | 20,1 / 9,6 | 13,2 / 4,8 | 15,5 / 4 | 21,6 / 5,8 | 20,7 / 6,9 | 71 / 21,5 |
| Total ⁷ | 98,6 / 43,7 | 96,9 / 39,7 | 96,7 / 40,9 | 99,8 / 42,4 | 100,6 / 43,75 | 492,6 / 210,45 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 3 | 1 |
| Associate Professor | 0 | 0 | 1 | 0 | 6 | 1 | 3 | 1 | 5 | 0 | 3 | 1 |
| Assistant Professor | 0 | 0 | 16 | 7 | 15 | 4 | 7 | 5 | 4 | 0 | 1 | 1 |
| Assistant | 2 | 1 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ⁹ | 21 | 11 | 17 | 10 | 6 | 4 | 2 | 1 | 1 | 0 | 0 | 0 |
| Researchers in other categories ¹⁰ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹¹ | 0 | 0 | 1 | 0 | 5 | 4 | 4 | 3 | 2 | 0 | 1 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹² | 0 | 0 | 11 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹³ | 23 | 12 | 39 | 20 | 32 | 13 | 18 | 10 | 14 | 0 | 8 | 3 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|--------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | 4 | 1 |
| Associate Professor | 0 | 0 | 1 | 0 | 2 | 0 | 4 | 2 | 4 | 0 | 3 | 0 |
| Assistant Professor | 0 | 0 | 15 | 5 | 23 | 11 | 8 | 5 | 3 | 1 | 3 | 1 |
| Assistant | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ¹⁵ | 14 | 9 | 18 | 5 | 7 | 6 | 1 | 0 | 2 | 1 | 0 | 0 |
| Researchers in other categories ¹⁶ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹⁷ | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹⁸ | 0 | 0 | 18 | 6 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total ¹⁹ | 16 | 9 | 34 | 10 | 36 | 19 | 17 | 10 | 15 | 4 | 11 | 2 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Table 3.1.4 – Students

| Type of study | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Undergraduate | 124 | 58 | 108 | 51 | 109 | 54 | 127 | 60 | 122 | 53 | 409 | 203 |
| Master's ²⁰ | 172 | 91 | 131 | 63 | 108 | 57 | 111 | 58 | 172 | 97 | 481 | 263 |
| Doctoral | 113 | 55 | 128 | 66 | 118 | 59 | 118 | 58 | 112 | 57 | 136 | 69 |
| Lifelong Learning Courses | 7 | 5 | 50 | 29 | 94 | 54 | 68 | 44 | 152 | 125 | 371 | 257 |
| Total | 416 | 209 | 417 | 209 | 429 | 224 | 424 | 220 | 558 | 332 | 1397 | 792 |

Table 3.1.5 - Study programmes in Czech/English

| Type of study programme | Total ²¹ / Of which professional study programmes | | | | | | | | | | | |
|---------------------------|--|---|------|---|------|---|------|---|------|----|-------|----|
| | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
| Undergraduate | 7 | 0 | 8 | 0 | 6 | 0 | 4 | 0 | 5 | 0 | 9 | 0 |
| Master's | 9 | 0 | 10 | 0 | 6 | 0 | 6 | 0 | 7 | 0 | 12 | 0 |
| Doctoral | 20 | 0 | 20 | 0 | 20 | 0 | 20 | 0 | 16 | 0 | 20 | 0 |
| Lifelong Learning courses | 6 | 5 | 6 | 5 | 6 | 5 | 8 | 7 | 19 | 18 | 20 | 19 |
| Total | 42 | 5 | 44 | 5 | 38 | 5 | 38 | 7 | 47 | 18 | 61 | 19 |

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

3.1.6 – R&D&I capacities

| R&D&I field | FORD | FORD share [%] | Predominant type of research | Total share of industry group [%] |
|---|---|----------------|-------------------------------------|-----------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | | Zvolte položku. | 34,8 |
| | 1.2 Computer and information sciences | | Zvolte položku. | |
| | 1.3 Physical sciences | | Zvolte položku. | |
| | 1.4 Chemical sciences | 4,6 | Basic Research | |
| | 1.5 Earth and related environmental sciences | 26,3 | Balanced basic and applied research | |
| | 1.6 Biological sciences | 2,9 | Applied Research | |
| | 1.7 Other natural sciences | 1,0 | Applied Research | |
| 2. Engineering and Technology | 2.1 Civil engineering | 0,7 | Applied Research | 65,2 |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | | Zvolte položku. | |
| | 2.3 Mechanical engineering | 1,7 | Applied Research | |
| | 2.4 Chemical engineering | 4,5 | Applied Research | |
| | 2.5 Materials engineering | 2,8 | Applied Research | |
| | 2.6 Medical engineering | | Zvolte položku. | |
| | 2.7 Environmental engineering | 46,2 | Applied Research | |
| | 2.8 Environmental biotechnology | 9,3 | Applied Research | |
| | 2.9 Industrial biotechnology | | Zvolte položku. | |
| | 2.10 Nanotechnology | | Zvolte položku. | |
| | 2.11 Other engineering and technologies | | Zvolte položku. | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | | Zvolte položku. | |
| | 3.2 Clinical medicine | | Zvolte položku. | |
| | 3.3 Health sciences | | Zvolte položku. | |
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | | Zvolte položku. | |
| | 4.2 Animal and Dairy science | | Zvolte položku. | |
| | 4.3 Veterinary science | | Zvolte položku. | |
| | 4.4 Other agricultural sciences | | Zvolte položku. | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | | Zvolte položku. | |
| | 5.2 Economics and Business | | Zvolte položku. | |
| | 5.3 Education | | Zvolte položku. | |
| | 5.4 Sociology | | Zvolte položku. | |
| | 5.5 Law | | Zvolte položku. | |
| | 5.6 Political science | | Zvolte položku. | |
| | 5.7 Social and economic geography | | Zvolte položku. | |
| | 5.8 Media and communications | | Zvolte položku. | |
| | 5.9 Other social sciences | | Zvolte položku. | |
| 6. Humanities and the Arts | 6.1 History and Archaeology | | Zvolte položku. | |
| | 6.2 Languages and Literature | | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | | Zvolte položku. | |

| | | | | |
|--|--|-------|-----------------|-------|
| | 6.4 Arts (arts, history of arts, performing arts, music) | | Zvolte položku. | |
| | 6.5 Other Humanities and the Arts | | Zvolte položku. | |
| | Total | 100 % | - | 100 % |

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

Strong reputation of Faculty of Environmental Technologies (FET) within the scientific community is reflected in its numerous awards, active engagement in international journals, participation in professional societies, invited lectures, and contributions to research evaluation. Some of these activities are shown in Tables 3.2.1-4. Members of the Faculty of Environmental Technologies (FET) are deeply engaged in the field of R&D&I, which corresponds to the research and technological focus of FET and has led to high recognition in the scientific community.

Faculty staff received numerous awards in R&D&I between 2019 and 2023. actively contribute to international scientific journals as editorial board members and serve in program/scientific committees of prestigious conferences. They are also members of various professional societies and associations such as European Sustainable Phosphorus Platform (ESPP), theme: material and energy utilization of sewage sludge (assoc. prof. Michael Pohořelý), European Biochar Industry (EBI), theme: material and energy utilization of sewage sludge & biochar preparation, characterisation, and utilisation (assoc. prof. Michael Pohořelý), European Corrosion Federation (EFC), Working Party 4 – „Nuclear Corrosion“, theme: materials for nuclear energy systems and corrosion testing (assoc. prof. Jan Macák), European Cooperation Group for Corrosion Monitoring of Nuclear Materials (ECG COMON), theme: corrosion testing and monitoring of materials for nuclear power (assoc. prof. Jan Macák), The Circular Bio-based Europe Joint Undertaking (CBE JU) State representative group (prof. Kubička), Assoc. prof. Jana Říhová-Ambrožová is a member of the national jury of the Stockholm Junior Water Prize, International Water Association (IWA), where prof. Wanner and prof. Jenicek are members of management committees.

FET staff have delivered invited lectures at universities and conferences worldwide, while numerous foreign experts have given lectures at FET in a newly constructed auditorium designed for such events. Additionally, faculty members have been involved in evaluating national and European research grant programs. Selected significant results are presented in the tables below.

Beyond faculty awards, students have also received prestigious accolades in competitions and international conferences. For instance, the French Embassy Award "Make Our Planet Great Again" – Prize for Environment & Climate Research (Ing. Dominik Andreides, Ph.D., Ing. Markéta Andreides), the Frontier Lab Young Scientist Poster Award – PYRO 22 (Ing. Lukáš Kejla), and 1st place in the competition for the CzWA (Czech Water Association) Chairman's Award (Ing. Markéta Chlumecká), among others.

FET employees participate in numerous international conferences, frequently presenting their research, often as invited speakers. While the COVID-19 pandemic temporarily reduced in-person lectures, some were conducted online. Faculty members have also delivered talks at institutions

such as Kumasi Technical University (Ghana), Ton Duc Thang University, Stockholm University, the University of Regensburg, and Heilongjiang University.

During the monitored period, FET hosted lectures by academics from renowned institutions, including Technische Universität Wien, Katholieke Universiteit Leuven, Ghent University, and California State University. Faculty staff have also played key roles in evaluating national and European project calls, further demonstrating their expertise.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the award | Awarding institution |
|---|--|--|
| Jiří Wanner, prof. Ing., DrSc. | Honorary member of the European Water Association, 2019 | European Water Association; https://www.ewa-online.eu/honorary-membership.html |
| Jiří Wanner, prof. Ing., DrSc. | Honorary member of the International Water Association, 2021 | International Water Association; https://iwa-network.org/news/iwa-membership-awards-winners-announced-at-digital-congress/ |
| Jan Macak, assoc.prof., Ing., CSc. | Prof. Emil Votocek medal. | UCT Prague |
| Jan Macak, assoc.prof., Ing., CSc. | Dr. Milan Prazak's price. | Association of Corrosion Engineers |
| Jan Macak, assoc.prof., Ing., CSc. | Prof. Ferdinand Schulz medal | Faculty of Env.Prot.Technology of UCT |
| Lenka McGachy, Ing., Ph.D. | Fulbright Visiting Scholar | Fulbright commission |
| Hugo Kittel, Ing., CSc., MBA | Viktor Ettel Award | Czech Society of Industrial Chemistry |
| Milan Pospíšil, prof., Ing., CSc. | Medal of the Ministry of Education, Youth and Sports, 1st degree | Ministry of Education, Youth and Sports |
| Pavel Jeníček, prof., Ing., CSc. | Prof. Ferdinand Schulz medal | Faculty of Env.Prot.Technology of UCT |
| Pavla Šmejkalová, Ing., Ph.D. | Julia Hamáčková Award | UCT Prague |

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of scientific journal, ISSN |
|---|---|
| Daniel Maxa, Ing. Ph.D. | Petroleum & Petrochemical Engineering Journal (PPEJ), 2578-4846 |
| Daniel Maxa, Ing. Ph.D. | Fuels, 1804-2058 |
| Karel Ciahotný, assoc. prof., Ing.,CSc. | Fuels, 1804-2059 |
| Hlinčík Tomáš, assoc. prof., Ing. Ph.D. | Fuels, 1804-2060 |
| Michael Pohořelý assoc. prof., Ing., Ph.D. | Energies, ISSN 1996-1073 |
| Michael Pohořelý assoc. prof., Ing., Ph.D. | Carbon Research, ISSN 2731-6696 |
| Jan Macak, assoc.prof., Ing., CSc. | Fuels, 1804-2063 |
| Šimáček Pavel, assoc. prof., Ing., Ph.D. | Fuels, 1804-2064 |
| Jiří Wanner, prof. Ing., DrSc. | Water Science & Technology: Special Issue on Design, Operation and Economics of Large Wastewater Treatment Plants; ISSN 0273-1223; Water Sci Technol (2021) 84 (2); https://doi.org/10.2166/wst.2021.256 |
| David Kubička, prof. Ing. Ph.D. MBA | Sustainable Chemistry for the Environment, 2949-8392 |

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Invited lecture title | Name of host institution, or name of conference or event | Year |
|---|--|---|------|
| Vladimír Kočí, prof. Ing., Ph.D. | Current challenges of the Czech Republic in circulation economy | Kumasi Technical University Ghana | 2019 |
| Vladimír Kočí, prof. Ing., Ph.D. | Carbon footprint – a new context of business cooperation as a challenge for Viet Nam | Ton Duc Thang University | 2021 |
| Vladimír Kočí, prof. Ing., Ph.D. | Importance of environmental parameters in non-financial reporting of waste | University of Regensburg | 2023 |
| David Kubička, prof. Ing. Ph.D. MBA | Catalytic upgrading of Biomass | Heilongjiang University, Harbin, China | 2019 |
| David Kubička, prof. Ing. Ph.D. MBA | Catalytic upgrading of Biomass | Heilongjiang University, Harbin, China | 2019 |
| David Kubička, prof. Ing. Ph.D. MBA | Biomass-Derived Fuels and Chemicals by Aldol Condensation | 5th International Conference Catalysis for Renewable Sources: Fuel, Energy, Chemicals (CRS-5), Agios Nikolaos, Crete, Greece, | 2019 |
| David Kubička, prof. Ing. Ph.D. MBA | The role of heterogeneous catalysis in future biorefineries | RRB2023 – 19th International Conference | 2023 |

| | | | |
|--------------------------------|--|--|------|
| | | on Renewable Resources and Biorefineries, Riga, Latvia | |
| Jiří Wanner, prof. Ing., DrSc. | Demonstration pilot units of wastewater reuse for irrigation of urban greenery in Prague | Wiederverwendung von gereinigtem Abwasser, Technische Universität Wien | 2023 |
| Bartáček Jan, prof. Ing. Ph.D | Energy Efficiency in Wastewater Treatment | Workshop on Sustainability and Food Tech, Nanyang Technological University | 2019 |
| Jiří Wanner, prof. Ing., DrSc. | Source Control Strategy for Micro Pollutants | EU Green Week Partner Event: The 20th International EWA Symposium 2022 | 2022 |

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

| Name, surname and title(s) of the lecturer | Lecturer's employer at the time of the lecture | Invited lecture title | Year |
|--|--|---|------|
| Univ.-Prof. Dr.-Ing. Jörg Krampe | Technische Universität Wien, Austria | Energy Efficiency in Wastewater Treatment | 2019 |
| Prof. Celia M. Manaia, Ph.D. | Universidade Católica Portuguesa | Antibiotic Resistance in the Environment: Why it is important? | 2019 |
| prof. dr. hab. Łukasz Dziewit | University of Warsaw | Computational microbiology – from extreme environments to biotechnology | 2021 |
| prof. Lise Appels | Katholieke Universiteit Leuven, Belgium | Organic waste as a key feedstock in sustainable bioeconomy: smart resource recovery for energy, materials, and chemicals supply | 2021 |
| Prof. Hailong Wang, Ph.D. | School of Environmental and Chemical Engineering, Foshan University, China | Immobilization of heavy metals in soils amended with biochar | 2021 |
| Dr. Tahiana Ramanantoandro | University of Antananarivo, Madagascar | Waste management in Madagascar | 2022 |
| prof. Joseph S.M. Samec | Stockholm University, Sweden | “Lignin-first” – beyond monophenolic compounds | 2022 |
| Federica Zaccheria, Ph.D. | CNR Institute of Chemical Sciences and Technologies "G. Natta", Italy | The preparation of copper catalysts and their use for biomass derived platform molecules transformation | 2022 |

| | | | |
|------------------------|---|---|------|
| Prof. Joris W. Thybaut | Ghent University, Belgium | Refining the role of Carbon towards a Sustainable Future: a Process Perspective | 2023 |
| Petr Vozka, Ph.D. | California State University, Los Angeles, USA | Comprehensive Two-Dimensional Gas Chromatography (GCxGC) in the Analysis of Complex Chemical Mixtures | 2023 |

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the research project/programme call | Name of the contracting authority/guarantor of the project/programme call | Year |
|---|---|---|-------------|
| Karel Ciahotný, assoc. prof., Ing.,CSc. | Inter Excellence | Ministry of Education, Youth and Sports of the Czech Republic | 2019-2023 |
| Zlata Mužíková, Ing. Ph.D. | SIGMA-DC2 | Technology Agency of the Czech Republic | 2023 |
| Bartáček Jan, prof. Ing. Ph.D | REPARES | H2020 | 2019-2023 |
| Jiří Wanner, prof. Ing., DrSc. | WIDER UPTAKE | Horizon 2020 | 2020-2024 |
| Michael Pohořelý, assoc. prof., Ing., Ph.D. | VV 2021 | The Slovak Research and Development Agency | 2022 |
| Michael Pohořelý, assoc. prof., Ing., Ph.D. | INTER-EXCELLENCE | Ministry of Education, Youth and Sports (CZ) | 2019 |
| Marek Šír, Ing., Ph.D. | Environment for Life Programme | Technology Agency of the Czech Republic (TACR) | 2022 - 2023 |
| Marek Šír, Ing., Ph.D. | TREND Programme | Technology Agency of the Czech Republic (TACR) | 2022 |
| Jiří Kroužek, Ing., Ph.D. | Environment for Life Programme | Technology Agency of the Czech Republic (TACR) | 2019-2023 |
| Lenka McGachy, Ing., Ph.D. | Appel à Projets Générique 2023 | Scientific Operations in the National Research Agency (France) | 2023 |

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

1) REEF 2W; Co-applicant: prof. Jeníček; 2017-2020; Interreg central Europe

The REEF 2W project with subtitle “Increased renewable energy and energy efficiency by integrating, combining and empowering urban wastewater and organic waste management systems“ was performed by UCT Prague in cooperation with partners from Germany, Austria, Italy and Croatia (national leading partners: Berlin Centre of Competence for Water, BOKU Vienna, ENEA Bologna, North-West Croatia Regional Energy Agency).

Improving water and municipal waste management is a challenge for cities of the future – smart cities. In developed countries, the supply of drinking water and wastewater treatment accounts for about 4% of total electricity consumption and a growth is expected. The results of research within the REEF 2W project demonstrate that wastewater treatment plants (WWTPs) in particular are also capable of producing electricity and other forms of energy efficiently.

The European project within the Interreg Central Europe program, has shown ways to find new opportunities and reserves in the production of energy from renewable sources at WWTPs, how to integrate the production of energy from wastewater and other municipal waste and how to optimally use the energy produced in cities.

Optimally designed and operated wastewater treatment plants produce biogas from biomass, which is generated during treatment, as well as from other biodegradable waste, produce heat from wastewater using heat pumps, produce electricity using the hydraulic potential of water, photovoltaic cells or wind energy. The energy produced not only covers the needs of the wastewater treatment plant, but also offers the use of its surpluses in households or city infrastructure.

The UCT Prague was involved mainly in evaluation of diversified use of biogas for the production of electricity and heat using cogeneration units together with the production of biomethane for use in transport was verified.

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

2) Sustainable Product, Energy and Resource Recovery from Wastewater, Co-applicant: prof. Jeníček; 2016 – 2020; H2020 MSC

SuPER-W was a "European Joint Doctorate" program for highly motivated young scientists, combining state-of-the-art research with a comprehensive joint training program on Resource, Product and Energy Recovery from Wastewater with a strong collaboration between academic and private partners. It has started in 2016 and finished in 2020. Meanwhile, 15 PhD students have successfully finished their PhD within the project.

Project network comprises 5 academic partner institutions and 12 non-academic partners from different European countries, including industrial partners involved in technology development, SMEs focused on consultancy/engineering, a service provider, a government agency, and professional network organizations.

Super W brings together eminent scientists and non-academic sector representatives from multiple key disciplines to train young professionals, to optimize existing technologies and develop novel integrated technologies for product, energy and resource recovery from wastewater, to identify (potential) bottlenecks in the implementation and exploitation of these technologies and to stimulate policy input formulation.

Graduates of SuPER-W have obtained all essential knowledge and skills needed to turn economic and environmental problems, such as waste production, water pollution, greenhouse gas emissions and the decreasing availability of resources, into (economic) opportunities.

UCT Prague was involved by 3 Ph.D. topics which were solved in cooperation with TU Gent, UPC Barcelona and: TU Delft:

Bioavailability and forms of micronutrients in bioreactors for energy recycling from wastewater,
Minimizing sulfate emissions from anaerobic treatment of high-sulfur wastewater,
Minimizing sulfate emissions from anaerobic treatment of high-sulfur wastewater.

3) Joint European Canadian Chinese development of Small Modular Reactor Technology, Co-applicant: assoc. prof. Macák; 2020 – 2025; H2020 EURATOM

Among the potentially promising energy systems that should contribute to the development of a future low-carbon energy sector are the concepts of Generation 4 nuclear reactors. Among them, the supercritical water-cooled reactor (SCWR) concept plays a significant role. It is characterised by a simpler design, higher inherent safety and thermal efficiency than current light water reactors. Currently, the development of this concept is being addressed by the H2020 Euratom project ECC-SMART (Joint European Canadian Chinese development of Small Modular Reactor Technology). The project consortium consists of a total of 20 organisations from 15 countries: CV Řež, sro - coordinator (Cz), JRC Petten (EU), CIEMAT (Es), Institut Jozef Stefan (SI), Università di Pisa (It), Sheffield University (UK), STUBA Bratislava (Sk), ENEN (EU), BMGE Budapest (Hu), Nuclear Power Institute (Cn), Nottingham University (UK), Raten (Ro), IPP Centre LLC (UA), VTT (Fi), CNL (Ca), Shanghai University (Cn), KIT (De), KTH (Se), University of Science and Technology, Beijing (Cn) and UCT Prague (Cz).

The project is conceived as a multidisciplinary one and includes research in thermohydraulics, neutron physics and materials research. A team from Power Engineering Department (PED) is involved in the materials research. The main objective is to investigate the behaviour of materials considered as potentially applicable for the nuclear fuel cladding for SCWR. A major contribution of our team is the development and application of new methods for corrosion monitoring and corrosion data acquisition using electrochemical techniques. This work has significantly advanced the level of materials research at PED. Students are widely involved in the project (3 bachelor theses, 2 master theses and 1 doctoral dissertation defended, another 3 dissertations are in various stages of development).

Results were presented at 4 international and 3 national conferences and were published in 2 articles in scientific periodicals, indexed under WOS.

4) Residual xenobiotics reduction in fresh water under specific conditions of waterworks Káraný, Co-applicant: assoc. prof. Pohořelý; 2020 – 2023; Technology Agency of the Czech Republic

The Káraný waterworks is one of three resources of drinking water for the capital of Prague. It is based on treatment of surface water from the Jizera River by infiltration. The treatment plant capacity is 1000 L/s providing high-quality drinking water. The valuable rock infiltration area should be protected against clogging and contamination by undesirable substances. The aim of the project was to build and test a pilot plant based on granular activated carbon adsorption with the aim of testing the removal of xenobiotics (e.g., pharmaceuticals, pesticides, X-ray contrast agents) from surface water in the presence of natural organic substances present in raw water in up to a five order of magnitude excess compared to the target adsorbates. The pilot experiment was successful: even after two years of operation of the sorption filters, >80% of the inlet concentration of xenobiotics was removed with a few exceptions.

The project was interdisciplinary: it included the work of analysts, technologists and hydro/microbiologists.

The results of the project will be used by Vodárna Káraný, a.s., which was also a member of the project research consortium.

The main project researcher was Dekonta, a.s., which ensured the operation and construction of the pilot unit, in cooperation with our Faculty. A utility model was granted for the pilot plant: Equipment for tests of removal of trace xenobiotics in drinking water production, 35129, 1.6.2021 (out of six team members, two are women). The Faculty was fully responsible for the selection of suitable activated carbons using laboratory experiments.

The project was assessed as highly important and the research consortium received new grant to continue the project with regenerated GAC, i.e. to support the sustainability of the process (supported by the Technology Agency of the Czech Republic; SS07020146). The solution of this project is currently underway.

5) The shelf life of Sweet Crudes in the SSHR system and its evaluation, Applicant: Maxa, Ph.D.; 2021 – 2023; Technology Agency of the Czech Republic

The project was aimed at the support of the security of strategic oil reserves maintained by the State Material Reserves Administration. Its main goal was to verify the problem-free long-term storage of low-sulphur (“sweet”) crude oils in tanks used for the strategic reserves. Sweet crude oils present potential risks of technological problems and increased costs in long-term storage as they usually form deposits and have worse low-temperature properties. Suitable crude oil types need therefore to be selected for long-term storage on the basis of their prior laboratory evaluation.

The physicochemical properties of sweet crude oils and their changes during model experiments simulating long-term storage were studied. On the basis of the data obtained, methodologies were developed for storage tests, purchase of crude oil according to the required properties, and quality control of crude oils in storage tanks. This project has provided the State Material Reserves Administration with the necessary information to properly manage long-term sweet crude oil inventories while minimising associated technological risks. It will help to secure the feedstock supply for one of two Czech refineries (Kralupy) which requires low-sulphur crude oils as inputs, however, for political and historical reasons they are not yet included in the strategic stocks. The extreme importance of the project has become particularly evident after Russian invasion to Ukraine and consequent oil supply redirections.

The TITSSSHR922 project directly contributed to the mission of the Faculty of Environmental Technology of the University of Science and Technology in Prague in several key areas: strengthening raw material and energy security, promoting sustainable development and efficient use of raw materials, and emphasizing applied research and cooperation with industrial partners and government. It thus represents a significant example of application-oriented research that links academia with the practical needs of the state and industry.

6) Achieving Wider Uptake of Water-Smart Solutions (Wider Uptake), Applicant: prof. Wanner; 2020 – 2024; H2020

The Horizon 2020 project WIDER UPTAKE was carried out in the period 2020-2024 by a consortium of research teams from five countries: Norway, the Netherlands, Ghana, Italy and the Czech Republic. The scope of the project in the Czech Republic (FET UCT Prague, CTU Prague, PVS a.s.) was to demonstrate safe reuse of wastewater for irrigation of urban greenery.

The results of the project are available on the Water Europe Marketplace portal, where the joint product of all the research teams called WIDER UPTAKE Roadmap Guide is published. This roadmap offers a comprehensive framework for the deployment of symbiotic circular economy solutions in the water sector with a focus on wastewater reuse and resource recovery. It is a structured tool to help water sector managers and decision makers develop tailored roadmaps for the transition to a smart water society with an emphasis on sustainable water management.

The solution of this project allowed FET staff to establish effective contacts with the staff of the central water authorities of the country (Ministry of Environment and Ministry of Agriculture). Within the framework of the cooperation with the so-called stakeholders, FET also presented this project to established research and professional organizations in Cech Republic. In addition to several MSc. students, four PhD students also participated in the project and had the opportunity to participate in meetings of the project team in Norway, the Netherlands and Italy, and to discuss their results with foreign experts during two meetings of the project team organized in Prague.

The results of the project are now also used to update lectures and teaching in FET courses:

M217003 Biological Wastewater Treatment

P217003 Biological Wastewater Treatment and Reuse

and their English language equivalents.

The results of the Prague team's research are presented in separate chapters in two books published by Elsevier.

7) EU Wastewater Integrated Surveillance for Public Health, Co-applicant: prof. Bartáček; 2023 – 2026; EU4H

EU-WISH (EU-Wastewater Integrated Surveillance for Public Health) is a Joint Action under the EU4Health programme, which supports the policy priority of strengthening the European Union's capacity to prevent, prepare for and respond rapidly to serious cross-border health threats. The focus of EU-WISH is to support activities to strengthen and improve national capacities for wastewater public health surveillance by enhancing knowledge exchange and sharing best practices based on scientific evidence. The project started in November 2023 and will last for 36 months.

The project comes in very important time of the change of EU-wide legislation on urban wastewater treatment (the revised Directive (EU) 2024/3019 of the European Parliament and of the Council of 27 November 2024 concerning urban wastewater treatment). This legislation introduces the obligation of the member states to monitor the presence of selected pathogens and antibiotic-resistant bacteria in urban wastewater and EU-WISH aims to deliver necessary methodologies, sampling procedures, and science-based procedures for data utilization in the field of epidemiology.

The involvement of the Faculty of environmental technology allows our experts to transfer the outcomes of scientific projects to publicly relevant actions while actively influencing European and national policies related to wastewater surveillance. It is anticipated, that the outcomes of EU-WISH will be directly adapted while implementing wastewater surveillance systems on the level of the Czech Republic.

**8) Digital TWIN for Safety of Critical Infrastructure in water treatment plants (TWIN SKIN),
Coordinator: Prof. Bartáček, 2022-2023, Ministry of the interior of the Czech Republic**

Project implemented a digital twin of a water treatment plant (WTP) enabling the simulation of technological and process measures for various operating conditions, management of documentation and especially the management of operational risks. Thanks to the 24-hour prediction of raw water quality input using the computational algorithm of neural networks, operational risks are eliminated. This predictive knowledge of the input parameters to the water treatment process increases, together with the expert simulation in a mathematical model, the robustness of the critical infrastructure system and ensure the supply of quality drinking water to the population. Simulations in the digital twin are performed in real time on the infrastructure of testing authorities.

The members of the Faculty of environmental technology were able to utilize their deep knowledge of fundamental water treatment processes and to create a product that can be used by municipalities and utility companies for running their infrastructure while increasing the reliability of drinking water supply. Through filing the utility model (Deliverable VB01000006-V2 Digital twin of water treatment plant) we were able to deliver a product that is currently commercially available within the product portfolio of our partner – VDT Technology (see <https://www.vdttechnology.com/services/allapps/twin-skin>).

9) Unique ladderane phospholipids of anammox bacteria: potential valuable resource from sewage, Applicant: Prof. Bartáček, 2020-2022, Grant Agency of the Czech Republic

Anammox Planctomycetes that are often used in sewage treatment, contain unique membrane phospholipids called ladderanes. These phospholipids with 3 or 5 concatenated cyclobutene rings are present exclusively in the membranes of anammox bacteria and are hypothesized to decrease the diffusion of hydrogen ions and hydrazine (an intermediate of anammox metabolism) through the membranes.

This project aimed to isolate and study ladderane membranes with low diffusivity for various chemical agents (e.g. nutraceuticals). Further, factors affecting the distribution of different ladderanes in anammox membranes such as temperature or pH were identified. Research activities included the production of anammox enrichments with varying ladderane compositions, studies on proteins associated with ladderane membranes, development of ladderanes extraction procedure, optimization of analytics and development of techniques for invitro assembly of ladderane-based vesicles.

This project falls within the general aim of the activities of the Faculty of environmental technology to introduce new pathways to circularity. In this case, we were able to design novel ways of production of highly valuable product from wastewater-based biomass of anammox bacteria.

**10) Research platform on antibiotic resistance spread through wastewater treatment plants,
Coordinator: Prof. Bartáček, 2019-2023, H2020**

The REPARES project significantly contributed to the fulfillment of the mission of the Faculty of Environmental Technology at the University of Chemical Technology Prague, which focuses on

innovative and interdisciplinary approaches in the field of environmental protection. The main benefit of the project was the strengthening of the scientific excellence of the faculty, the expansion of international cooperation and the improvement of the ability to obtain prestigious research grants.

REPARES contributed to the research of antibiotic resistance in the aquatic environment and the creation of standards for the detection of antibiotic resistance genes (ARGs) not only in wastewater as such but also in wastewater treatment plants (WWTPs). The project created an ARGs database, which was integrated into the already existing MiDAS Field Guide - a renowned database of microorganisms in WWTPs. The faculty thus gained access to valuable data and participated in their collection and analysis.

An important aspect of the project was the mobility of researchers and the education of students and academic staff. Research internships at partner institutions, professional seminars and summer schools were implemented, focusing not only on research methodology, but also on managing scientific teams and communicating with the non-academic sector. Thanks to this, the faculty expanded its international networks and gained new partners for future cooperation.

The project had a strong interdisciplinary dimension, as it connected the fields of environmental chemistry, microbiology, bioinformatics and engineering. The institutions involved brought unique expertise - for example, Aalborg University contributed to bioinformatics, TU Delft focused on new biotechnological processes and Wetsus ensured the transfer of knowledge to the non-academic sphere. This broad interdisciplinary approach allowed not only a more comprehensive view of the issue of antibiotic resistance, but also the creation of methodologies transferable to practice in the field of water resource protection.

Thanks to REPARES, the faculty not only participated in solving a current global environmental problem but also consolidated its position as a key player in European antibiotic resistance research.

Table 3.3.1 Projects supported by public funds

| In the role of beneficiary | | | | | | |
|--------------------------------|---|--------------------------------|-------------------|-------------------|-------------------|-------------------|
| Provider ²⁵ | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Research platform on antibiotic resistance spread through wastewater treatment plants | 9341 / 368 | 1875 / 74 | 2895 / 114 | 1242 / 49 | 4122 / 163 |
| European comission | Achieving wider uptake of water-smart solutions | 0 / 0 | 1101 / 43 | 3335 / 132 | 5087 / 201 | 3406 / 134 |
| European comission | | 9341 / 368 | 2976 / 117 | 6229 / 246 | 6329 / 250 | 7528 / 297 |
| GACR | Physiological response of anammox bacteria to cold shocks | 1586 / 63 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Unique ladderane phospholipids of anammox bacteria: potential valuable resource from sewage | 0 / 0 | 3833 / 151 | 3696 / 146 | 3696 / 146 | 0 / 0 |
| GACR | Degradation of benzophenone-type UV filters in aqueous solutions using peroxydisulfate | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 2189 / 86 |
| GACR | | 1586 / 63 | 3833 / 151 | 3696 / 146 | 3696 / 146 | 2189 / 86 |
| Ministry of Industry and Trade | Support for increased expertise in friction analysis of oils and lubricants | 623 / 25 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |

| | | | | | | |
|---------------------------------------|---|-----------------|-----------------|--------------|-------------------|-------------------|
| Ministry of Industry and Trade | | 623 / 25 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | Digital TWIN for Safety of Critical INfrastructure in water treatment plants | 0 / 0 | 0 / 0 | 0 / 0 | 5174 / 204 | 4161 / 164 |
| Ministry of the Interior | | 0 / 0 | 0 / 0 | 0 / 0 | 5174 / 204 | 4161 / 164 |
| Other foreign | shAMRock: shocking antimicrobial resistance | 0 / 0 | 248 / 10 | 0 / 0 | 0 / 0 | 0 / 0 |
| Other foreign | | 0 / 0 | 248 / 10 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Technologies for removal of antibiotic resistance genes from sewage sludge applied in agriculture | 0 / 0 | 2666 / 105 | 5265 / 208 | 4126 / 163 | 1741 / 69 |
| TACR | Machine Learning Approach Using Cloud Computing and Water Quality Prediction to Reduce Emmisions to the Water Ecosystems | 0 / 0 | 2880 / 114 | 5930 / 234 | 6161 / 243 | 0 / 0 |
| TACR | The use of treated wastewater in water management of cities of the future | 1775 / 70 | 1685 / 66 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Modular technology for separate treatment of grey water | 1531 / 60 | 1483 / 59 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Optimal use of renewable energy sources in transport | 1510 / 60 | 0 / 0 | 1868 / 74 | 0 / 0 | 0 / 0 |
| TACR | The shelf life of Sweet Crudes in the SSHR system and its evaluation | 0 / 0 | 0 / 0 | 1624 / 64 | 2725 / 108 | 87 / 3 |
| TACR | Prediction of stability of diesel oils during their long-term storage | 0 / 0 | 0 / 0 | 1708 / 67 | 2491 / 98 | 1113 / 44 |
| TACR | Development of a comprehensive separating device for removing selected contaminants from wastewater of tunneling | 750 / 30 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Development of technology eliminating micropollutants and antibiotic resistance genes input into the environment and the human organism | 969 / 38 | 1975 / 78 | 715 / 28 | 0 / 0 | 0 / 0 |
| TACR | Development of multifunctional sampler and procedure for determination of microplastic pollution of watercourses in the Czech Republic | 2284 / 90 | 3339 / 132 | 551 / 22 | 0 / 0 | 0 / 0 |
| TACR | UTILIZATION OF ALUMINIUM BEARING RAW MATERIALS FOR THE PRODUCTION OF ALUMINIUM METAL, OTHER METALS AND COMPOUNDS | 0 / 0 | 0 / 0 | 0 / 0 | 2689 / 106 | 3173 / 125 |
| TACR | Resistance and degradation of alloys in high temperature gaseous medium | 4006 / 158 | 4638 / 183 | 5171 / 204 | 5212 / 206 | 5054 / 199 |
| TACR | Model support for clean and sustainable mobility in the Czech Republic | 0 / 0 | 0 / 0 | 0 / 0 | 2647 / 104 | 3030 / 120 |
| TACR | System for obtaining carbon dioxide from flue gases usable for the production of synthetic methane and other fuels | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1925 / 76 |

| | | | | | | |
|--|---|----------------------------|---------------------|---------------------|---------------------|---------------------|
| TACR | | 12824 / 506 | 18666 / 736 | 22832 / 901 | 26051 / 1028 | 16123 / 636 |
| TOTAL | | 24374 / 962 | 25723 / 1015 | 32758 / 1292 | 41250 / 1627 | 30001 / 1183 |
| In the role of another participant | | | | | | |
| Provider ²⁵ | Project name | Support (in thousands CZK) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Innovative management of COAL BY-PROducts leading also to CO2 emissions reduction | 1232 / 49 | 550 / 22 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | Sustainable Product, Energy and Resource Recovery from Wastewater | 3020 / 119 | 1380 / 54 | 0 / 0 | 0 / 0 | 0 / 0 |
| European comission | Joint European Canadian Chinese development of Small Modular Reactor Technology | 0 / 0 | 132 / 5 | 602 / 24 | 770 / 30 | 1201 / 47 |
| European comission | | 4252 / 168 | 2062 / 81 | 602 / 24 | 770 / 30 | 1201 / 47 |
| Ministry of Education, Youth and Sports | ADAR - Accelerator Driven Advanced Reactor | 325 / 13 | 385 / 15 | 412 / 16 | 285 / 11 | 0 / 0 |
| Ministry of Education, Youth and Sports | | 325 / 13 | 385 / 15 | 412 / 16 | 285 / 11 | 0 / 0 |
| Ministry of Industry and Trade | HERMIA - Development of modern technology for processing gastro-waste and BRO using larvae of flies Hermetia illucens | 0 / 0 | 0 / 0 | 0 / 0 | 1435 / 57 | 1056 / 42 |
| Ministry of Industry and Trade | Biofilter with dielectric heating | 604 / 24 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | | 604 / 24 | 0 / 0 | 0 / 0 | 1435 / 57 | 1056 / 42 |
| Ministry of the Interior | Advanced system of prevention and reduction of consequences for spread of hazardous air in integrated rescue system | 0 / 0 | 0 / 0 | 0 / 0 | 1001 / 39 | 700 / 28 |
| Ministry of the Interior | Decontamination technology for case of threat of hazardous chemical and biological agens spread in indoor air | 1921 / 76 | 1921 / 76 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | | 1921 / 76 | 1921 / 76 | 0 / 0 | 1001 / 39 | 700 / 28 |
| Other foreign | Ore Mountains - new ideas for a sustainable future | 0 / 0 | 46 / 2 | 0 / 0 | 576 / 23 | 0 / 0 |
| Other foreign | REEF 2W | 1146 / 45 | 813 / 32 | 0 / 0 | 0 / 0 | 0 / 0 |
| Other foreign | Ore Mountains - new landscapes - new opportunities | 765 / 30 | 1225 / 48 | 0 / 0 | 0 / 0 | 0 / 0 |
| Other foreign | | 1911 / 75 | 2084 / 82 | 0 / 0 | 576 / 23 | 0 / 0 |
| TACR | Combination of Advanced Oxidation Processes (AOP) and Membrane Separations for Industrial Wastewater Treatment | 0 / 0 | 493 / 19 | 493 / 19 | 493 / 19 | 0 / 0 |
| TACR | Nanostructured catalysts for advanced decontamination processes | 0 / 0 | 1354 / 53 | 1354 / 53 | 1247 / 49 | 1247 / 49 |

| | | | | | | |
|------|--|-----------|------------|------------|------------|------------|
| TACR | Residual xenobiotics reduction in fresh water under specific conditions of waterworks Káraný | 0 / 0 | 1239 / 49 | 1239 / 49 | 1239 / 49 | 1239 / 49 |
| TACR | Thermal processing of agricultural by-products onto substances usable as bio-fuels | 905 / 36 | 905 / 36 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Joint leakage optimization and determination and helium recovery from coolant leakage in generation four helium cooled reactors | 1561 / 62 | 1561 / 62 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Separation of strategic elements from solid coal combustion residuals | 1223 / 48 | 1418 / 56 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Carbon dioxide methanation in biogas | 919 / 36 | 849 / 33 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Combined mobile technology for the treatment of a decentrally produced elaborately processible wastewater | 963 / 38 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Application of membrane contactors for the removal of organic pollutants from waste streams | 1002 / 40 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | On-site thermal decontamination of hazardous solid wastes | 592 / 23 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Material Transformation of Sewage Sludge into a Fertilizer with Increased Phosphorus Content | 702 / 28 | 696 / 27 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Life Cycle Assessment of electricity and thermal energy production | 717 / 28 | 717 / 28 | 717 / 28 | 0 / 0 | 0 / 0 |
| TACR | Filtration Unit for Membrane Distillation | 1312 / 52 | 1300 / 51 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | Reduction of the pollutants content in emission gases and waste waters via zeolite sorbents and their composites | 1247 / 49 | 1356 / 53 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | NEWSAK Active infiltration layer for environmental friendly rainwater management | 704 / 28 | 725 / 29 | 704 / 28 | 697 / 28 | 0 / 0 |
| TACR | Nanotechnology for reducing the hazardous phosphorus impact on the environment | 618 / 24 | 618 / 24 | 618 / 24 | 0 / 0 | 0 / 0 |
| TACR | Biomethanization of carbon dioxide to biomethane using hydrogen | 1121 / 44 | 1145 / 45 | 1095 / 43 | 960 / 38 | 662 / 26 |
| TACR | Vehicle life cycle environmental impact assessment | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1175 / 46 |
| TACR | Research and development project of material utilization technology of waste plastics and tires in the refinery and petrochemical industry in the Czech Republic | 0 / 0 | 6097 / 240 | 5605 / 221 | 4709 / 186 | 4415 / 174 |
| TACR | Digital Twin of a Wastewater Treatment Plant for Treatment Simulation and Optimization in Real Scale and Time | 0 / 0 | 0 / 0 | 0 / 0 | 1032 / 41 | 1071 / 42 |
| TACR | Digital twin of water reuse technologies | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 972 / 38 |

| | | | | | | |
|--------------|--|--------------------|---------------------|--------------------|---------------------|---------------------|
| TACR | Centre of environmental research: Waste management, circular economy and environmental security | 0 / 0 | 0 / 0 | 5523 / 218 | 6512 / 257 | 6728 / 265 |
| TACR | Water systems and water management in the Czech Republic in conditions of climate change | 0 / 0 | 360 / 14 | 719 / 28 | 915 / 36 | 787 / 31 |
| TACR | Application of biodegradable polyurethane foams for enhanced nitrification at wastewater treatment plants | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 604 / 24 |
| TACR | Purification and purity control of CO ₂ gas in power cycles | 506 / 20 | 1138 / 45 | 1076 / 42 | 1076 / 42 | 1076 / 42 |
| TACR | Stability and resistance of materials for high temperature helium circuits | 491 / 19 | 1253 / 49 | 1191 / 47 | 1191 / 47 | 1191 / 47 |
| TACR | Low-emission technologies of energy conversion of biomass and alternative fuels | 0 / 0 | 240 / 9 | 1460 / 58 | 1428 / 56 | 1440 / 57 |
| TACR | The use of ultrafiltration and nanofiltration in liquid radioactive waste processing | 0 / 0 | 0 / 0 | 0 / 0 | 1531 / 60 | 1238 / 49 |
| TACR | Instrumentation of in-situ measurements for high-temperature applications of classical and advanced nuclear reactors | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 522 / 21 |
| TACR | National Centre for Energy II | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 503 / 20 |
| TACR | | 14584 / 575 | 23464 / 926 | 21794 / 860 | 23034 / 909 | 24869 / 981 |
| TOTAL | | 23598 / 931 | 29916 / 1180 | 22808 / 900 | 27098 / 1069 | 27824 / 1098 |

Table 3.3.2 - Contract research activities

| Client ²⁵ | Activity name | Revenue (in thousands CZK/EUR) | | | | |
|-----------------------|--|--------------------------------|--------|----------|---------|---------|
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| PRAZKE VODOVODY A K | Analysis, tests | 415/16 | 176/7 | 2523/100 | 1868/74 | 684/27 |
| BAYERNOIL RAFFINERIE | Analyses of HTL and TCR oils | 0/0 | 0/0 | 0/0 | 0/0 | 2249/89 |
| SEVEROCESKE VODOVODY | Determination of biogas composition | 152/6 | 48/2 | 158/6 | 962/38 | 911/36 |
| SEVEROCESKA SERVISNI | Determination of the composition of biogas and siloxanes | 706/28 | 648/26 | 714/28 | 0/0 | 0/0 |
| CEZ, A. S. | Analysis, boiler tube diagnostics, ion exchange tests | 159/6 | 32/1 | 216/9 | 159/6 | 839/33 |
| SUSPRO S.R.O. | Development of a technological scheme of the separation device, laboratory test | 0/0 | 400/16 | 0/0 | 0/0 | 989/39 |
| WASTEN, Z.S. | Studies, analyses - biodegradable waste | 0/0 | 0/0 | 400/16 | 490/19 | 499/20 |
| UNIPETROL RPA, S.R.O | Ttraining, audit, analysis | 237/9 | 352/14 | 271/11 | 251/10 | 256/10 |
| U.CHEMICKYCH PROCESU | Analysis | 405/16 | 405/16 | 122/5 | 90/4 | 85/3 |
| UJP PRAHA A.S. | Evaluation of corrosion transitions of alloys | 150/6 | 200/8 | 150/6 | 200/8 | 200/8 |
| SGS CZECH REPUBLIC, | Fuel analysis | 141/6 | 193/8 | 136/5 | 173/7 | 192/8 |
| MERO CR, A.S. | Consulting activities, analyses, preparation of oil mixtures | 178/7 | 113/4 | 261/10 | 112/4 | 111/4 |
| CROSSBRIDGE ENERGY A | Hydrotreating of cotton bio-crude, Hydrotreating of Sludge2Fuel bio-oil | 0/0 | 0/0 | 0/0 | 244/10 | 527/21 |
| PLASTIKARSKY KLASTR | Processing of LCA study | 360/14 | 0/0 | 400/16 | 0/0 | 0/0 |
| CVUT Fakulta stavební | Specific surface area measurement, Ecotoxicology, Ecotoxicity of concrete | 36/1 | 42/2 | 389/15 | 286/11 | 0/0 |
| ASIO TECH, SPOL. S R | Laboratory determination, consultation, microbiological analysis of cooling waters | 59/2 | 45/2 | 0/0 | 539/21 | 39/2 |

²⁵ If the client is from abroad, indicate in brackets the country of origin of the client.

| | | | | | | |
|--|--|--------|--------|--------|--------|--------|
| SKODA AUTO A.S. | Determination of the microscopic image, water analysis, CO emission tests, determination of CO2 emissions of automotive recyclates | 50/2 | 5/0 | 358/14 | 12/0 | 241/9 |
| PRIMAGAS S.R.O. | LPG analysis | 150/6 | 129/5 | 139/5 | 97/4 | 134/5 |
| AEM - ATELIER EKOLO | Determination of PAH emissions from motor vehicles | 632/25 | 0/0 | 0/0 | 0/0 | 0/0 |
| CI CONSULT&RESEARCH Praha 1 | Distillation separation of raw pyrolysate | 0/0 | 617/24 | 0/0 | 0/0 | 0/0 |
| GE AVIATION CZECH S. | Aviation kerosene analysis | 52/2 | 69/3 | 79/3 | 253/10 | 145/6 |
| REFORK DISTRIBUTION | Anaerobic degradability tests | 33/1 | 33/1 | 499/20 | 0/0 | 0/0 |
| ALS CZECH REPUBLIC, | Determination of kinematic viscosity, heat transfer oil analysis | 137/5 | 55/2 | 123/5 | 115/5 | 123/5 |
| UNIPETROL VYZKUMNE V | Co-processing of FT wax | 0/0 | 504/20 | 0/0 | 0/0 | 0/0 |
| ENRESS S.R.O. | Pyrolysate analyses | 0/0 | 0/0 | 0/0 | 13/0 | 490/19 |
| BIOPLYN ENERGY S.R.O | Sampling, research, proposals for digestate processing | 0/0 | 0/0 | 0/0 | 0/0 | 499/20 |
| RANIDO, S.R.O. | Catalyst testing for FT synthesis | 0/0 | 0/0 | 0/0 | 415/16 | 80/3 |
| REFORK SE | Research for storage of biodegradable products | 0/0 | 0/0 | 480/19 | 0/0 | 0/0 |
| CVUT Fakulta strojní | Aviation fuel analysis | 23/1 | 56/2 | 142/6 | 198/8 | 43/2 |
| TRINECKE ZELEZARNY, | Pipeline sediment analysis | 116/5 | 103/4 | 138/5 | 60/2 | 38/1 |
| SKODA AUTO A.S. Účtárna kreditorů - FRK - buňka č. 1 | Microbiological analysis of samples | 423/17 | 0/0 | 0/0 | 0/0 | 0/0 |
| SKO-ENERGO, S.R.O. | Studies - biomass evaluation methodology, flash point determination, Water analysis - precipitation | 0/0 | 0/0 | 145/6 | 0/0 | 237/9 |
| CVUT Univerzitní centrum energeticky efektivních budov | Sands and recyclates - ecotoxicology | 32/1 | 28/1 | 232/9 | 0/0 | 82/3 |
| AL INVEST BRIDLICNA, | Determination of hydrocarbon content, measurement of corrosion resistance of Al alloys | 190/7 | 106/4 | 10/0 | 43/2 | 8/0 |

| | | | | | | |
|---|--|--------|-------|-------|-------|--------|
| RWE GAS STORAGE CZ, | Condensate analysis, seal testing | 0/0 | 50/2 | 161/6 | 41/2 | 101/4 |
| SKODA PRAHA A.S. | Wastewater analysis | 15/1 | 193/8 | 63/2 | 0/0 | 56/2 |
| VUT V BRNE | Tar analysis | 13/0 | 36/1 | 0/0 | 0/0 | 250/10 |
| USTAV FYZIKALNI CHEM | Surface analysis | 74/3 | 108/4 | 59/2 | 57/2 | 0/0 |
| NUVIA A.S. | Determination of mechanical strength | 34/1 | 0/0 | 201/8 | 0/0 | 58/2 |
| NET4GAS, S.R.O. | Condensate samples analysis, surface analysis | 60/2 | 166/7 | 0/0 | 56/2 | 0/0 |
| ELDIAG S.R.O. | Determination of the content of furans in the samples | 115/5 | 5/0 | 20/1 | 65/3 | 75/3 |
| WERBA | Analysis of waxe | 48/2 | 75/3 | 61/2 | 24/1 | 72/3 |
| BORGWARNER TURBO SYS | Corrosion Test of Cu Alloys in M15 | 265/10 | 0/0 | 0/0 | 0/0 | 0/0 |
| PANASONIC AVC NETWORK | Analytical work and laboratory determinations | 0/0 | 0/0 | 0/0 | 85/3 | 174/7 |
| MINISTERSTVO ZIVOTNI Odbor posuzování vlivů na životní prostředí a integrované prevence | IRZ 3 update | 33/1 | 58/2 | 134/5 | 0/0 | 0/0 |
| CEZ ENERGETICKE PROD | Boiler tube samples diagnostics | 0/0 | 0/0 | 21/1 | 204/8 | 0/0 |
| CEPRO, A.S. | Determination of HVO content, research on the oxidation stability of diesel fuel | 0/0 | 64/3 | 160/6 | 0/0 | 0/0 |
| ENERGETICKE OPRAVNY, | Analysis of oxide layers on the surface | 0/0 | 0/0 | 40/2 | 20/1 | 160/6 |
| VODARNA PLZEN A.S. | Microscopic analysis of activated sludge | 11/0 | 30/1 | 25/1 | 91/4 | 61/2 |
| MONDI STETI A.S. | Biological and microbiological analysis of samples | 48/2 | 17/1 | 3/0 | 135/5 | 5/0 |
| SKODA JS A.S. | Study of the properties of desiccants for packaging | 200/8 | 0/0 | 0/0 | 0/0 | 0/0 |
| STEPEKO S.R.O. | Initial research and laboratory tests | 200/8 | 0/0 | 0/0 | 0/0 | 0/0 |
| PRVNI BRNENSKA STROJ | Verification of water content in penetrant | 46/2 | 32/1 | 24/1 | 40/2 | 46/2 |
| SPRAVA KRNAP VRCHLAB | Sampling and chemical analysis of surface water samples | 185/7 | 0/0 | 0/0 | 0/0 | 0/0 |
| DOOSAN SKODA POWER | Sample and sediment analysis | 56/2 | 33/1 | 9/0 | 49/2 | 38/1 |
| CESKA AGENTURA PRO S | Standards development | 0/0 | 73/3 | 24/1 | 43/2 | 43/2 |

| | | | | | | |
|---|--|-------|------|-------|-------|-------|
| PROVOD - INZENYRSKA | Experimental verification of the temperature phased anaerobic digestion technology | 0/0 | 0/0 | 0/0 | 180/7 | 0/0 |
| PRAZSKA TEPLARENSKA | Analyses of sediments from the hot water cycle | 0/0 | 0/0 | 0/0 | 55/2 | 118/5 |
| VVS MEMSEP S.R.O. Meteor Centre Office Park B | Anaerobic batch test | 108/4 | 0/0 | 0/0 | 65/3 | 0/0 |
| E.ON CESKA REPUBLIKA | Evaluation of remediation and venting of ecological burden | 0/0 | 0/0 | 49/2 | 74/3 | 49/2 |
| DEKONTA, A.S. | Ecotoxicological analyses of greywater | 48/2 | 34/1 | 85/3 | 0/0 | 0/0 |
| SAMPLE BRATISLAVA | Determining the type of annex | 0/0 | 87/3 | 0/0 | 42/2 | 38/1 |
| ROLNICKA SPOLECNOST | Biogas analysis | 0/0 | 0/0 | 54/2 | 55/2 | 55/2 |
| LAURICH S.R.O. | Laboratory analysis of samples | 37/1 | 31/1 | 26/1 | 33/1 | 24/1 |
| DM DROGERIE MARKT S. | Life cycle assessment study | 150/6 | 0/0 | 0/0 | 0/0 | 0/0 |
| WTLINE S.R.O. | Microbiological water analysis | 59/2 | 46/2 | 38/2 | 0/0 | 3/0 |
| RODINNY PIVOVAR | Propagation of an archive yeast strain | 30/1 | 35/1 | 18/1 | 31/1 | 31/1 |
| VEOLIA CESKA REPUBLI | Preparation of a model samples of wastewater | 0/0 | 0/0 | 20/1 | 44/2 | 73/3 |
| ZEMSPOL STUDENKA A.S | Biogas analysis | 42/2 | 0/0 | 31/1 | 32/1 | 31/1 |
| CE POWER INDUSTRIES | Analysis of the output products of pyrolysis | 0/0 | 0/0 | 0/0 | 118/5 | 11/0 |
| PLZENSKY PRAZDROJ, A | Biogas analysis | 25/1 | 0/0 | 39/2 | 30/1 | 30/1 |
| RECTICEL INTERIORS C | Sprayclean fluid analysis | 14/1 | 2/0 | 70/3 | 10/0 | 28/1 |
| PRAZSKE SLUZBY, A.S. | Monitoring of sodium concentration in the dam | 11/0 | 64/3 | 2/0 | 3/0 | 45/2 |
| TRIME S.R.O. | Processing of the study of the CO2 footprint of technology | 0/0 | 0/0 | 120/5 | 0/0 | 0/0 |
| AGRA GROUP A.S. | Analytical work | 0/0 | 0/0 | 0/0 | 70/3 | 50/2 |
| LATECOERE CZECH REPU | Periodic penetrant analysis | 26/1 | 20/1 | 21/1 | 26/1 | 24/1 |
| TEMPERATOR S.R.O. | Detergent ability tests of motor fuels | 0/0 | 0/0 | 50/2 | 30/1 | 35/1 |
| BMTO GROUP A.S. | Measuring the size of starch grains | 112/4 | 2/0 | 0/0 | 0/0 | 0/0 |
| VLADEKO SPOL. S R.O. | Qualitative analysis of filter matrices | 0/0 | 48/2 | 0/0 | 0/0 | 65/3 |

| | | | | | | |
|----------------------|---|----------|----------|-----------|----------|-----------|
| PLASTOIL EUROPE, A.S | Separation and evaluation of pyrolysate | 0/0 | 0/0 | 50/2 | 0/0 | 60/2 |
| TEPLARNA KLADNO S.R. | Analyses of fly ash samples | 0/0 | 109/4 | 0/0 | 0/0 | 0/0 |
| MATEJCEK JIRI | Assessment of samples from heating systems | 15/1 | 37/1 | 32/1 | 9/0 | 14/1 |
| REGARTIS SRO | Analytical work and analytical determination of selected parameters | 80/3 | 0/0 | 0/0 | 25/1 | 0/0 |
| LAIRD S.R.O. | Analytical determination of selected parameters | 0/0 | 49/2 | 52/2 | 0/0 | 0/0 |
| Others | Others | 2440/96 | 1380/54 | 1366/54 | 1456/57 | 2505/99 |
| Total | | 9430/372 | 7240/286 | 11207/442 | 9873/389 | 14126/557 |

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁶, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment:

1) Research report; Life cycle analysis of selected electricity production methods in the Czech Republic; prof. Kočí, Šerešová, Ph.D., Zakuciová, Ph.D., Štefanica, Ph.D., Vítvarová, Vlček

The methodology outlined in the project focuses on assessing environmental impacts using the Life Cycle Assessment (LCA) approach, specifically the Product Environmental Footprint (PEF) methodology recommended by the European Commission. This project aims to provide a standardized framework for evaluating environmental impacts across different sectors, with a particular emphasis on energy production. By applying comprehensive environmental impact indicators, such as carbon footprint, resource depletion, and pollution, the project enables businesses and policymakers to make data-driven decisions that enhance sustainability.

The social impact of this project is substantial, as it supports the transition to more sustainable industrial practices. By quantifying environmental impacts, it encourages corporate responsibility and transparency, helping industries meet regulatory requirements and align with European sustainability goals. Furthermore, the project contributes to public awareness by providing clear and comparable environmental data, which can guide consumer choices and promote sustainable production methods.

The project also incorporates a gender dimension by emphasizing inclusive decision-making processes. Since environmental policies and sustainability measures affect different demographic groups in diverse ways, the methodology encourages broad participation from both men and women.

Additionally, sustainable industries create employment opportunities that can contribute to reducing gender disparities in technical and scientific fields.

From a sustainability perspective, this project ensures long-term viability by providing a replicable and adaptable model for environmental impact assessment. The methodology aligns with EU climate policies and circular economy strategies, enabling companies to minimize their ecological footprint while improving resource efficiency. Ultimately, this project serves as a critical tool for fostering a sustainable economy that balances economic growth, environmental protection, and social responsibility.

2) Functional sample, Ozone detector; Martinec, Ph.D.

The portable ozone detector was developed to enhance occupational safety in hazardous environments. Originally designed for the Fire and Rescue Service, it is now used by selected fire and rescue units during emergency operations. To enhance workplace safety, the detector has been distributed free of charge to some units, with the possibility of future commercialization. Its affordability and efficiency also make it relevant for industrial safety, environmental monitoring, and public health protection. The detector's low-cost production reduces healthcare and operational expenses, supporting economic sustainability. It also contributes to environmental safety by preventing ozone overexposure. The development and deployment of the ozone detector considered gender-inclusive design principles, ensuring that the device is ergonomic, easy to operate, and suitable for all users, regardless of gender, age, or physical strength. This innovation exemplifies effective research transfer, improving safety standards while delivering broader societal and economic benefits. Its impact extends beyond emergency responders, with potential applications in workplace safety and environmental health both in the Czech Republic and internationally.

3) Utility model, Equipment for tests of removal of trace xenobiotics in drinking water production; assoc. prof. Šváb, Štěpánková, Skalický, assoc. prof. Pohořelý, assoc. prof. Jelínek, assoc. prof. Parschová

The utility model Šváb M., Štěpánková B., Skalický M., Pohořelý M., Jelínek L., Parschová H.: Equipment for tests of removal of trace xenobiotics in drinking water production, 35129, 1.6.2021 originally arose as a result of the TAČR project SS01020063 Reduction of the content of trace xenobiotics in drinking water under specific conditions of the Káraný source, which ended in 2024. It involved the design and construction of a pilot plant tailored to the Káraný waterworks. However, it is currently used in a new project Long-term reliable production of quality drinking water using activated carbon while respecting the circular economy concept TAČR SS07020146 (2024-2026). Nowadays, the model is used for verification of long-term operational properties of reactivated GAC in the conditions of the Káraný waterworks, and proposing suitable procedures for assessing the influence of GAC reactivation conditions on the actual sorption properties of GAC in the production of drinking water. The above research results will lead to positive impacts on the quality of drinking water in the capital city of Prague in the near future (the treatment plant's capacity is 1000 L/s).

The main project researcher is Dekonta, a.s. The faculty participated in the construction of the utility model through laboratory experiments and consulting activities.

The connection with practice is documented by the fact that the co-author of the utility model is the Káraný Waterworks, which will implement the project results into full operation.

The protection of this water source is obvious: it has been in operation for over a century and produces high-quality drinking water by infiltration through the sand aquifer.

The sustainability implications are obvious: it involves the use of recycled and reactivated activated carbon.

The gender dimension is also obvious: two of the six authors of the utility model are women.

4) Patent, Method of removing acutely toxic substances from air, especially in emergency situations, and a device for this; Kroužek, Ph.D., Mašín, Ph.D., Rippelová, Ph.D., Škarohlíd, Ph.D., Hendrych, Ph.D., Durdák, Ph.D.

The invention No. 308959, “Method of removing acutely toxic substances from air, especially in emergency situations, and a device for this” patented in the Czech Republic, is set to deliver significant societal and economic benefits by addressing critical challenges in hazardous material disposal and chemical security. This technology enables the safe and efficient decomposition of toxic gases, reducing environmental contamination risks and occupational exposure. Its broad applicability extends to emergency response units, industrial safety teams, waste management companies, and regulatory authorities, ensuring a far-reaching impact across multiple sectors. By lowering operational costs related to hazardous waste transportation and disposal, the invention provides a cost-effective solution for industries managing chemical byproducts and obsolete gas storage. Additionally, it enhances workplace safety by minimizing health risks linked to toxic gas exposure. The technology is designed for gender inclusivity, ensuring it is user-friendly and accessible to operators of diverse physical capabilities. Furthermore, it supports sustainability objectives by eliminating hazardous chemicals at the source, mitigating long-term environmental and health impacts, and improving hazardous waste disposal practices.

5) Research report; Summary Report on the Occurrence of the SARS-CoV-2 Virus in Wastewater in the Territory of Prague and a Description of the Correlation Between the Presence of the Virus in Wastewater and the Spread of COVID-19 in the Population; prof. Bartáček

This deliverable (SS01020112-V5) was the outcome of the project TAČR „Technology for removing antibiotic resistance genes from sewage sludge applied in agriculture“ (2020-2023), which evaluated the effectiveness of technologies for sanitation of sewage sludge in terms of their ability to remove antibiotic resistance. As a reaction on COVID-19 outbreak in Europe in 2020, research on monitoring the SARS-CoV-2 virus in urban wastewater was included, which aimed to deliver epidemiology-relevant data on COVID-19 spread in the population.

The research described in the report focused on:

- (1) the development and validation of an experimental methods for sewage sampling, pretreatment of the samples, extraction of viral RNA, and the quantification of viral load in sewage through reverse transcription polymerase chain reaction (RT-qPCR)
- (2) the quantification of SARS-CoV-2 RNA in sewage from different sources (hospitals, residential areas, nursery houses, student dormitories etc.)
- (3) the quantification of the relative abundance of SARS-CoV-2 variants through RNA sequencing techniques

The research was done closely with the Prague utility company (PVK a.s., project partner) and some governmental agencies (National Institute of Public Health - NIPH, Prague Hygiene Station – PHS, Military Medical Agency - MMA). The main outcomes described in the report include the establishment of standard operation methods adopted by both PVK and NIPH. Up to this time, both institutions regularly sample Prague wastewater to monitor COVID-19 spread among the population.

NIPH data are publicly available at <https://experience.arcgis.com/experience/edf5d157c31741a3b28e9aaa99d21d93/page/Str%C3%A1nka/?views=%C3%9A%C4%8COV-St%C3%A1vaj%C3%ADc%C3%AD-linka-Praha&org=SZU2>.

Furthermore, our data were used for the management of 9 elementary schools in a Prague district (Prague 8) in autumn 2021, where systematic wastewater monitoring was implemented and PCR testing of all students and teachers was performed upon the detection of SARS-CoV-2 in wastewater. As a consequence of this research, further cooperation with PHS was established for the control of other diseases, e.g. Mokey pox virus in 2022.

6) Research report; Visbreaking of raw materials containing cracking residue; Maxa, Ph.D.

The refinery industry remains a crucial component of the global economy, despite ongoing low-carbon energy transition and intensive efforts to find alternative energy sources. Research focused on improving the yield of refinery products, particularly through deep conversion of residual fractions, has a significant societal and environmental impact - more efficient utilization of petroleum resources enables waste reduction and optimization of fuel and petrochemical production, thereby decreasing the need for new raw material extraction and its associated environmental burden.

The study focuses on the use of visbreaking, a robust cracking process that offers the possibility of extended use of various residual fractions, to process other than straight-run feedstocks. The experiments focused on the partial or complete replacement of conventional feedstock with heavy residues from other refining processes. The effect of reaction temperature and feedstock composition on the yields of key products and their composition and physicochemical properties was studied. The research results indicate that even under slightly more demanding reaction conditions, significant yields of valuable products can be achieved. Additionally, the reduction of insoluble products can lead to less equipment fouling, resulting in longer service life for industrial equipment. This contributes to economic sustainability and increased efficiency of production processes.

From a broader perspective, the research helps refineries make better use of existing resources, potentially leading to reduced dependence on crude oil imports. Improved economic efficiency and a lower environmental footprint contribute to the overall sustainability of the industry, which is crucial in the context of current climate goals.

7) Utility model, System for determining operational tasks at a wastewater treatment plant; Chalupa, Stejskal, Sýkora, Ph.D., Charvátová, Ph.D., Dolejš, Ph.D., prof. Bartáček, Andreides, BAreš, Ph.D., Fencel, Ph.D.

This deliverable from TAČR Project SS01020210 „Using cloud computing and predictive wastewater analysis to reduce emissions into the aquatic ecosystem“ is a utility model describing an intelligent tool (i.e. algorithm) developed to provide predictive information on the quality and quantity of wastewater influent of a wastewater treatment plant (WWTP) and to use this information to create operational measures (manuals) at the WWTP to minimize negative impacts of WWTP effluent on the aquatic ecosystem (intelligent prevention based on a knowledge base). The tool is a web-based application using machine learning to work with input data on water quality and other factors such as the prediction of precipitation intensity.

The application of this algorithm for predicting wastewater quality and quantity in the daily management of water infrastructure is part of the broader digital transformation of the entire water sector. This transformation aims to enhance the efficiency and resilience of water infrastructure, particularly in the face of global climate change. Additionally, as water infrastructure is considered a critical component of public utilities, the use of digital tools such as the Water Scan Toolbox enables utility companies to operate more safely while minimizing environmental impact.

8) Utility model, Equipment for non-dispersive extraction of organic substances from waste water; Durdák, Ph.D., Mašín, Ph.D., Kroužek, Ph.D., assoc. prof. Šváb

This membrane unit enables non-dispersive extraction of organic substances from wastewater, offering significant societal benefits. Its automated pressure control and self-regulation enhance the efficiency and reliability of removing harmful substances from wastewater and contaminated groundwater. This reduces water source contamination risks and improves water quality for both human and ecosystem needs. The technology's versatility allows simultaneous removal of volatile and non-volatile organic compounds, making it valuable for wastewater treatment plants, industries, and municipalities. Unlike traditional methods requiring stripping and activated carbon adsorption for volatile compounds, this system integrates both processes, reducing energy and resource consumption while enhancing sustainability. Although the technology itself lacks a direct gender dimension, access to clean water positively impacts public health and quality of life. Its adoption can lead to measurable economic benefits, including lower water treatment costs, reduced healthcare expenses, increased life expectancy, and improved environmental protection.

9) Utility model, Mobile unit for treating difficult-to-treat wastewater; Hendrych, Ph.D., Špaček, Ph.D., Honzajková, Ph.D., Mikeš, Ph.D.

The technical solution involves a mobile unit for treating industrial and consumer wastewater contaminated with organic pollutants. It employs advanced oxidation, combining oxidative reagents, ultraviolet radiation, and ultrasonic waves to degrade contaminants. The system enables complete or partial pollutant decomposition, making it suitable for primary treatment, post-treatment, or pre-treatment before biological processes. Designed for efficiency, the compact, fully equipped unit requires minimal operator expertise, is easily transportable, and allows process parameter adjustments for various wastewater types. Key applications include facilities generating small volumes of highly polluted wastewater with irregular production, sites where sewer discharge is unfeasible, temporary treatment needs, and pilot-scale testing of advanced oxidation technologies. This solution enhances sustainability by eliminating pollutants that conventional treatments fail to remove, preventing contamination of surface and groundwater. The gender dimension is considered in sustainability, ensuring equitable access to clean water and environmental protection. Improved wastewater management benefits communities, particularly those disproportionately affected by pollution, including women, who often bear greater responsibility for water-related household and agricultural activities. By addressing these disparities, the solution supports inclusive environmental management and resource sustainability.

10) Utility model, Mobile box for on-site decontamination of solid materials; Durdák, Ph.D., Hendrych, Ph.D., Kroužek, Ph.D., MAšín, Ph.D., Maštalka

This innovative remediation technology offers an efficient solution for removing semi-volatile contaminants from hazardous solid waste. Its key advantages include modularity, simple assembly, and on-site applicability at contaminated locations. Developed for Dekonta, a.s., a leading medium-sized enterprise in the Czech remediation and environmental engineering market, this technology aligns with their strategic focus on R&D and advanced technology integration.

From 2020 to 2022, the technology underwent extensive testing with tens of tons of PAH-contaminated soil, demonstrating its efficiency, economic viability, and technical reliability. Despite these promising results, widespread application has been limited due to reduced contract volumes and competition from landfilling, a simpler but environmentally harmful waste processing method. Alternative option to handle target waste material is waste incineration which is much more

expensive; on the contrary, biodegradation methods are inefficient for materials with very toxic contamination.

As the EU intensifies efforts to reduce landfilled hazardous waste in support of a circular economy, the benefits of our recycling technology are expected to become increasingly significant. Dekonta is currently focused on ensuring legislative compliance, seeking development assistance projects and offering the technology in complex remediation projects. The technology's versatile properties and parameters allow for application in various situations while maintaining low investment and operating costs. Its implementation is independent of the volume of contaminated soil or on original locality, and does not require highly qualified operating staff. Moreover, the technology allows to significantly reduce environmental negative effects including greenhouse gas emissions compared to traditional landfilling methods, contributing to a more sustainable environment. Future projects and collaborations are already in the pipeline, promising broader application and impact.

Table 3.4.1 - Overview of research results in the period under evaluation

| Type of result ²⁶ | Year of application | Name |
|------------------------------|---------------------|---|
| Research report | 2019 | Visbreaking of raw materials containing cracking residue |
| Utility model | 2019 | Equipment for non-dispersive extraction of organic substances from waste water |
| Utility model | 2019 | Mobile box for on-site decontamination of solid materials |
| Utility model | 2019 | Mobile unit for treating difficult-to-treat wastewater |
| Research report | 2020 | Life cycle analysis of selected electricity production methods in the Czech Republic |
| Patent | 2021 | Method of removing acutely toxic substances from air, especially in emergency situations, and a device for this |
| Utility model | 2021 | Equipment for tests of removal of trace xenobiotics in drinking water production |
| Functional sample | 2022 | Ozone detector |
| Utility model | 2022 | System for determining operational tasks at a wastewater treatment plant |
| Research report | 2022 | Summary Report on the Occurrence of the SARS-CoV-2 Virus in Wastewater in the Territory of Prague and a Description of the Correlation Between the Presence of the Virus in Wastewater and the Spread of COVID-19 in the Population |

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

²⁶ Specify the specific type of result. Add rows as needed.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)²⁷, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).²⁸

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

The Rector's Office for Research and Technology Transfer (R&TTO) is established centrally for all faculties at UCT Prague and provides support in the areas of intellectual property protection, commercialization, and the transfer of results generated at UCT Prague. In these activities, the R&TTO collaborates with the Vice-deans for Science and Research of individual faculties and the heads of research groups.

When a result with application potential is identified, the R&TTO conducts a technology assessment, including a preliminary patent search and a basic market potential analysis. Based on this evaluation, the R&TTO recommends an intellectual property (IP) protection strategy and an exploitation strategy, which may include further development, licensing, sale, or the establishment of a spin-off company.

A significant part of commercialization involves securing contracts with industrial partners based on the know-how and research results generated by the faculties.

An exemplary case is a project resulting in the Life cycle analysis of selected electricity production methods in the Czech Republic research report (see example 1). This research not only helps to reduce energy losses but also contributes to the transition towards cleaner and more sustainable energy sources. Other examples of transferring research results to industrial practice include patents and utility models (examples 2–4 below).

The final example highlights the effectiveness of research transfer during the COVID-19 pandemic. Research into the presence of SARS-CoV-2 in wastewater had both financial impacts and significant societal and reputational benefits for FET.

²⁷ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

²⁸ If the commercialisation of R&D&I results is carried out in this way.

1) Research report; Life cycle analysis of selected electricity production methods in the Czech Republic; prof. Kočí, Šerešová, Ph.D., Zakuciová, Ph.D., Štefanica, Ph.D., Vítvarová, Vlček

This project focuses on sustainable energy production and its integration into modern energy systems. The methodology developed provides a standardized approach for evaluating energy efficiency, resource utilization, and environmental performance. By aligning with European Commission standards, the project supports businesses and policymakers in optimizing energy strategies and implementing cost-effective, sustainable solutions.

The adoption of this methodology requires minimal implementation costs, as it builds upon existing quality management and environmental management frameworks. It enables energy producers to assess the entire energy production chain, identify efficiency improvements, and enhance resource optimization. This not only helps to reduce energy losses but also contributes to the transition towards cleaner and more sustainable energy sources.

The economic benefits include lower operational costs for energy producers, improved grid stability, and enhanced regulatory compliance. By improving energy efficiency and reducing waste in the sector, the project could generate estimated savings of up to 1 billion EUR in the Czech Republic over the next 10 years. These savings come from reduced energy losses, improved fuel efficiency, and optimized infrastructure investments.

This methodology provides a scalable and replicable model for energy producers, supporting the long-term transition to a more sustainable and economically viable energy system.

2) Utility model, Ozone detector; Martinec, Ph.D.

As part of the Ministry of the Interior of the Czech Republic project No. VI04000023, a portable ozone detector was developed using readily available and cost-effective components. The device measures ozone concentrations from 0.01 ppm to 1000 ppm, making it suitable for fire and rescue services, industrial safety, and environmental monitoring. While initial units were distributed free of charge to selected emergency teams, further deployment depends on demand from public institutions, private sector stakeholders, and manufacturers. Its affordability compared to existing solutions enhances commercial viability, supporting broader market adoption. Ongoing efforts focus on expanding production and distribution, ensuring long-term accessibility and integration into safety protocols. This initiative highlights how scientific innovation leads to practical applications, benefiting both public safety and commercial sectors.

3) Patent, Method of removing acutely toxic substances from air, especially in emergency situations, and a device for this; Kroužek, Ph.D., Mašín, Ph.D., Rippelová, Ph.D., Škarohlíd, Ph.D., Hendrych, Ph.D., Durdák, Ph.D.

The invention No. 308959, is currently undergoing commercialization under an agreement on the use of results from a collaborative research project between its two owners, UCT Prague and the Czech company Dekonta, a.s. As a leading Czech company in environmental engineering, Dekonta is both the patent holder and intended user of this unique technology, with plans to apply it in the field of chemical security. One of Dekonta's divisions specializes in environmental emergency response services, an integral part of the integrated rescue system. To support the technology's implementation, a follow-up project (2022–2023) was conducted to rigorously test its performance under simulated emergency scenarios, including toxic vapor releases, CBRN attacks, and the removal of old pressure vessels. The latter application is experiencing significant growth due to a substantial market gap. Thousands of unregistered, decades-old pressure cylinders in poor condition require safe disposal. The patented technology is designed to decompose all toxic gases contained within

these cylinders and can be deployed directly on-site. Recently, intensive development efforts have focused on refining the necessary technological components to ensure adaptability for this critical challenge.

4) Utility model, System for determining operational tasks at a wastewater treatment plant; Chalupa, Stejskal, Sýkora, Ph.D., Charvátová, Ph.D., Dolejš, Ph.D., prof. Bartáček, Andreides, BAreš, Ph.D., FencI, Ph.D.

Upon signing a series of contracts with the project partners (PVK a.s., VDT Technology), the tool (Water Scan Toolbox – WST) has been implemented at the Prague Central WWTP since 2024 and its implementation has been contractually agreed on at 6 other WWTPs. For all these applications, commercial licenses were sold by the consortium of which UCT Prague is a member. For the first license, UCT received a one-time payment, while the other contracts resulted in a yearly payment (more appropriate commercial model).

The tool is commercially available as the part of market portfolio of VDT Technology (see www.vdttechnology.com/services/water/wst).

5) Research report, Summary Report on the Occurrence of the SARS-CoV-2 Virus in Wastewater in the Territory of Prague and a Description of the Correlation Between the Presence of the Virus in Wastewater and the Spread of COVID-19 in the Population, prof. Bartáček

Besides its societal importance, the research on SARS-CoV-2 presence in sewage also translated into financial benefits for the faculty, as it resulted in repeated commercial contracts with Prague’s utility company PVK. During 2021 and 2022, PVK ordered wastewater analyses with a total value of more than 30 thousand euros.

Moreover, this research was conducted together with colleagues from the Department of Biochemistry and Microbiology (Faculty of Food and Biochemical Technology) who were able to introduce the analysis of SARS-CoV-2 in water into their portfolio accredited analyses. Thus, the two groups jointly offer the analysis to other potential partners on a commercial basis.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

| Type of revenue | Revenue (in thousands CZK/EUR) | | | | |
|--|--------------------------------|--------|---------|---------|----------|
| | 2019 | 2020 | 2021 | 2022 | 2023 |
| Donations to support research and student research activities (in total) | 43 / 2 | 58 / 2 | 167 / 7 | 146 / 6 | 839 / 33 |
| | | | | | |
| | | | | | |
| Total | 43 / 2 | 58 / 2 | 167 / 7 | 146 / 6 | 839 / 33 |

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

This is an important activity of UCT. FET staff and students participate in regular university-wide activities: Summer School, Science Festival, Youth Academy, European Science Night. We also offer activities encouraging our students' interest in R&D&I: "Contact", an event introducing enterprises to students as potential employers, often through Alumni. At Student Scientific Conferences, students present their projects to the industry. The best works are rewarded both by industry and scientific organisations. Appearances of scientists in classical media and on social networks are supported by the UCT Communication Department. The following table lists the 10 most significant activities in the area in which FET is heavily involved:

1) Summer school for high school teachers and high school students (2019 – 2023)

The Summer school Chemistry for Life is organized annually by the University of Chemistry and Technology Prague for high school chemistry teachers and their students. Over the course of three days, 12-15 professional lectures from various areas of chemistry (biochemistry, food chemistry, materials chemistry, chemistry in pharmacy and environmental protection) are presented. Participants can visit the laboratories of the University of Chemistry and Technology, where they can try out simple experiments that can then be prepared for students at their high schools. Participation in the Summer School ranges from 110-130 teachers and 120-140 students.

2) Vodakást (2021-2023)

Vodakást is a podcast that features interviews with personalities from the water management. Its goal is to showcase the diverse career opportunities available to water management graduates, explore current trends in the field, and discuss future developments. The main objective of the podcast is to connect the academic and practical aspects of water management, educate young water managers in a virtual environment, and inform the public. The information presented aims to enhance understanding of the relevance of knowledge gained through academic studies, providing practical insights for students and aspiring professionals in water management.

More details: <https://open.spotify.com/show/4LYOcV8vZa8pJ3JxTzcWY5>

3) ScienceFest (2019 – 2023)

VědaFest (ScienceFest) is the largest open-air science outreach event in Czechia, held annually in the Dejvice district. The festival provides visitors with the opportunity to engage with the latest scientific discoveries through interactive exhibitions, hands-on experiments, and expert lectures. The Faculty of Environmental Technology (FET) is one of the principal organisers of the event and plays a key role in its regular programming.

4) Open Days at UCT Prague (DOD, 2019 – 2023)

The Open Days at UCT Prague are unique events designed for prospective students, offering them detailed insights into study programs at our university. Those interested can explore the university's facilities and laboratories, where an interactive and educational program is prepared, allowing them

to meet academic staff as well as current students. The Faculty of Environmental Technology (FET) actively co-organizes these Open Days. Additionally, our faculty is an active participant in the Open University program, where prospective students can experience life at UCT by accompanying one of our current students. This includes visiting the campus, attending lectures, and observing laboratory work.

5) Youth Academy (UCT Prague +DDM Prague) (2019 – 2023)

Organization of popularization lectures for secondary school students, 2019 - 2023 Lecturers from all over UCT with a focus on lecturers who can captivate talented but still lay listeners with their speech.

6) Researchers' Night (2019 – 2023)

The Faculty of Environmental Technology (FET) as part of the UCT Prague regularly participates in the European Researchers' Night, when the doors of scientific departments, universities, museums and other participating institutions are opened and visitors can see research presentations. Visitors can look under the hands of researchers at stations with demonstrations of chemistry experiments, workshops and creative workshops for the youngest. The school's labyrinth offers a range of tours that highlight intriguing areas, complete with clear explanations and engaging demonstrations designed for non-chemists and the general public.

More details: <https://www.nocvedcu.cz/en>

7) Zvědaví - audiovizuální profily (2022-2023)

The #Zvědaví project showcases a group of young individuals who have embarked on their scientific and technological journeys at UCT Prague. Through a series of audiovisual portraits, it documents their unique life paths driven by a desire to understand the world through the natural sciences. Members of the Faculty of Environmental Technology (FET) are an integral part of the project.

8) Secondary school professional activities (2019 –2023)

Secondary school professional is a competition of talented high school students in solving professional problems. It usually takes place in three rounds in the form of competition shows, in which the competitors defend their works. The most successful solvers are often selected to participate in similar international competitions. Full-time high school students can participate in the competition.

Secondary school professional activity is a voluntary hobby activity of students of all types of secondary schools, which they carry out in their schools, extracurricular facilities, clubs. The result is an independently developed work or teaching aid, which is submitted for professional assessment and is subsequently defended before a professional jury. The aim of the competition is to help find talented students, guide them to an independent and creative approach, support them and professionally develop their growth. Students have the opportunity to participate in professional activities that will deepen and improve their knowledge in an interesting and practical way.

9) University of the 3rd Age (U3V, 2019 –2023)

The University of the Third Age (U3V) is one of the forms of lifelong learning that the University of Chemical Technology in Prague (UCT Prague) implements as a member of the Association of Universities of the Third Age. The aim of the courses is to provide seniors with the opportunity to systematically familiarize themselves with the latest knowledge in the areas taught at the University of Chemical Technology in a qualified manner and at a university level. The organization of U3V courses is the basis for the continuous mental development of citizens of post-productive age, who not only expand their knowledge, but above all stimulate their interest in current events, the practical use of acquired knowledge and a constant active approach to life.

10) Secondary school visits (2021-2023)

The Faculty of Environmental Technology (FET) significantly contributes on visits to local secondary schools organized by the university to introduce its programmes and offerings to potential students. During these visits prospective applicants are introduced to various aspects of study including:

- the study programs
- the structure and demands of the courses
- the quality of teaching
- opportunities for practical experience in laboratories and fieldwork
- technical equipment
- accommodation options
- sports activities and student clubs
- involvement in research projects
- collaboration with industry during the thesis
- opportunities for studying abroad
- employment prospects in the labor market etc.

These visits aim to provide a comprehensive picture of what faculties offer to support students' academic and professional development.

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

The previous international evaluation of the University of Chemical Technology in Prague focused on educational, scientific and overall effectiveness was organized in 2020. The Faculty of Environmental Technology of the UCT Prague, as part of the university, was also subject to evaluation.

Based on the conclusions of the International Evaluation Panel, the management of the Faculty of Environmental Technology found most of the recommendations useful and decided to implement them to the maximum extent possible. For the purposes of further development of the faculty, a summary of recommendations was prepared and discussed at the Dean's College in March to May 2021. The faculty management subsequently used the summary in steering the faculty in the following years.

Implementation of recommendations is divided according to area of evaluation:

Applied research projects

Grade 5 out of 5

No recommendations were proposed. We tried to persevere our activities in this area.

Contract research

Grade 4 out of 5

The faculty's performance in contract research was declining compared to previous decades. This was a consequence of the restructuring of industry in the Czech Republic. We can only marginally participate in the overall change of the trend within our thematic areas. We tried to focus on larger projects and minimize service analyzes on a low budget.

We tried to offer comprehensive packages of services, i.e. joint projects of several faculty departments, which will have a more extensive scope. We already have experience with such projects, and they have proven themselves, such as the Hitecarlo project.

Revenues from non-public sources, grants

Grade 4 out of 5

So far, the situation was relatively good, but the question is how successful we will be in obtaining grants in the future (possible Green Deal revision, cutting of public budgets). Here we need to be themed up-to-date. We were focusing more on complex and cross-cutting issues. The narrow focus of some working groups is limiting.

We evaluate whether the research topics that we traditionally and long-term develop still represent current scientific trends and whether they are not absorbed by routines already addressed in the commercial sphere. Our expertise must not serve as service support, but as avant-garde research.

We strengthen international projects, also in the educational field (IMATEC, IMETE).

We encourage students to participate in all types of projects. They gain professional experience directly from industrial partners or with project management.

Applied research results

Grade 4 out of 5

Basically okay, persevere we.

Increase the number of active workers. Alternatively, spatially strengthen teams with the best results in science and research.

Significant applied research results

Grade 4 out of 5

In cooperation with the Technology Transfer Department, we improve knowledge about the possibility of offering patents and contract research to professional partners.

We see our reserve in submitting projects in cooperation with other faculties.

The evaluated unit's most significant interactions with the non-academic application/corporate sphere

Grade 4 out of 5

Persevere in the current activities, strengthen. An example of new directions of cooperation with corporate sphere: cooperation with the Česká spořitelna bank in environmental assessment of technologies.

System and support of technology transfer

Grade 4 out of 5

Cooperation with Technopark Kralupy recommended. The regular meetings of. Vice-dean Kubička and Director of Technopark Kralupy Mr. Petrák are organized.

Current collaboration between the Faculty and Technopark Kralupy (TPK) can be divided into three types:

First, there is an (informal) GreenCats research group led by prof. Kubička that consists of employees of TPK and of the Department of Sustainable Fuels and Green Chemistry. This group has executed numerous research projects (2 EU projects, one of which is ongoing; >5 Czech Science Foundation projects, 2 of which are ongoing, 2 Czech Technology Agency projects, one of which is ongoing).

Second, several scientists from the Faculty execute their projects of industrial collaboration with TPK – these include collaboration of Dr. Kujalová with Envi-pur regarding the improvement of drinking water treatment technology, assoc. prof. Pokorná with EPS Biotechnology regarding bio-methanization technology, or Dr. Vurm with Wasten regarding the technology for processing of biological waste.

Third, the Faculty has cooperated with TPK during the preparation of a large scale project – National center of competence – that aimed CO₂ valorization and decarbonization processes (that has

unfortunately not received funding) and is currently involved in preparation of an infrastructural project related again to decarbonization of the chemical industry in the Czech Republic.

Strategy for setting up and support of spin-off firms

Grade 4 out of 5

In a cooperation with Department of Technology Transfer we have evaluated the possibilities to support the establishment of spin-off companies e.g. by offering patents and utility models to professional partners to foster innovations developed in the Faculty. We discuss a definition of rules of cooperation between the LCA studio spin-off and the Faculty.

The most significant individual awards for R&D&I

Grade 4 out of 5

Congratulations given to us, but 5 mark was not given ... We have focused now much more on application aspect in grant projects especially in the framework of Technology Agency of the Czech Republic

Recognition by the international R&D&I community

Grade 4 out of 5

Congratulations given to us, but 5 mark was not given ... Persevere in the current activities, strengthen.

We support and actively offer our nominations for staff and student awards.

We support membership of our staff in international organizations and companies. It is costly financially and time-consuming.

We intensify existing contacts with foreign partners.

The most significant activities in the popularization of R&D&I

Grade 5 out of 5

Persevere and increase the activity.

Use media, LinkedIn, Instagram, X(Twitter) etc.

We are monitoring the effectiveness of our popularization in relation to number of students applying to the faculty.

Overall rating

Grade 4 out of 5

We should generally continue in our activities. General direction is good.

Recommendation:

Cooperation with Technopark Kralupy and cooperation with industry (beside interest of traditional partners such as Unipetrol, the gas industry, Veolia)

Implementation and support of technology transfer

Support the establishment of spin-off companies

Cooperation with other faculties of UCT Prague

Strengthen employee membership in international companies.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

| Document name | No. criteria | Location (link in HTML) |
|--------------------|--------------|---|
| Spotify VodaKást | 3.6 | https://open.spotify.com/show/4LYOcV8vZa8pJ3JxTzcWY5 |
| Researcher's night | 3.6 | https://www.nocvedcu.cz/en |
| | | |
| | | |

SELF-EVALUATION REPORT FOR MODULE 3

THE NAME OF THE UNIT BEING EVALUATED:

Technopark Kralupy nad Vltavou University of Chemical Technology in Prague

FORD: 2 - Engineering and technology

SOCIAL CONTRIBUTION OF THE EVALUATED UNIT

3.1 Introductory information about the unit under evaluation

The evaluated unit will describe its mission and vision and provide a general self-reflection of the societal contribution of R&D&I, along with its long-term goals in the fields it develops. The distribution of research activities by type of research will also be commented on.¹ The evaluated unit will describe its organisational structure and size (staffing, number of students, number of study programmes implemented, etc.) based on the data provided in annex tables 3.1.1 to 3.1.6.

Maximum 1000 words.

This is a non-rated indicator that serves as an introduction to the evaluated unit, providing context for data in indicators 3.2-3.7.

Self-assessment:

Technopark Kralupy nad Vltavou of the University of Chemical Technology in Prague as a university is an independent part of the UCT in Prague with its own organizational structure according to the Statute of the University of Chemical Technology in Prague. Technopark is not a legal entity.

The headquarters of the Technopark is located at. G. Karse 7, Kralupy nad Vltavou, postcode 278 01.

The detached workplace of the Technopark is the CirkTech Centre. This workplace is located on the site of Holcim Česko, a.s., Čížkovice.

Vision of Technopark

Technopark is an important and innovative workplace in the field of corrosion engineering and materials research, especially in the areas of applications of aluminosilicate materials.

Technopark has a defined internal structure of research groups, complemented by an analytical chemistry group. Individual research groups collaborate on multidisciplinary projects.

When resolving specific scientific projects, Technopark employees use cooperation with academic departments in Dejvice.

¹ Basic, applied, contract, artistic research (see Definition of Terms in Methodology HEI2025+).

For the commercialisation of research results in the field of aluminosilicates and other technologies for the circular economy, Technopark owns and develops a semi-operational facility for the testing of developed technologies at the CirkTech detached workplace.

This workplace is the basis of a research centre focused on technologies for the circular economy. The construction of the centre will be supported by the Just Transition Fund.

Within the VŠCHT, Technopark plays the role of a contact centre for cooperation with the application sphere.

It is respected and sought after by the professional community in these fields.

Technopark's mission

To implement research and innovation processes and technology transfer in the field of corrosion engineering, building chemistry and related fields of materials research.

To provide services to industrial partners and to support these activities in the following areas:

project management,

resourcing (financial, personnel, material),

testing.

To create possibilities and opportunities for students (not only at the VŠCHT) to participate in grant and commercial projects on the basis of employment with the possibility of using the results in thesis or PhD theses.

Involve students, especially from VŠCHT Prague, in semi-operational experiments at the CirkTech workplace, and provide conditions for the use of this facility in their thesis and dissertation work.

To build and develop relations with the application sphere on the basis of mutually beneficial cooperation.

Promote UCT primarily in the Central Bohemia region through active communication with the local municipality and secondary and grammar schools.

CirkTech project

An experimental reactor was built on the premises of the Holcim Česko, a.s. cement plant in 2021 to verify the patented technology for extracting Li from zinnwaldite. The aim was to obtain documents for licensing negotiations. It is a cement kiln, including a pre-calciner, the kiln itself and a cooler with a capacity of about 1 tonne per day and an operating temperature of up to 1,400°C.

At the end of 2021 and the beginning of 2022, successful experiments were carried out to confirm the applicability of the patented technology on a semi-operational scale.

In 2022, significant financial support from the EIT fund was obtained for the final validation of the patented technology. Unfortunately, due to lack of interest from commercial partners, mainly politically motivated, the project was not launched and the allocated funding was returned. This fact became a significant impetus for the search for further use of the experimental facility, which was successful in establishing cooperation with Holcim Innovation Centre, France and preparing a project application for the construction of the CirkTech workplace within the framework of the Just Transformation Fund.

Technopark's workplaces are not part of the educational infrastructure of UCT Prague, but focus on cooperation with businesses.

Applied research is mainly carried out at Technopark workplaces. The main part of research activities were projects supported within the Operational Programme for Innovative Technologies, mainly in the APPLICATIONS and Innovation Vouchers programmes. The Technopark provides the necessary facilities for the successful solution of these projects in various fields, including for the UCT departments located at Dejvice.

Another important group are projects of cooperation with the application sphere on a commercial basis. These are mainly expertise and testing of material properties.

The projects of the GA CR are also primarily focused on obtaining a certain amount of know-how, which is subsequently applied in cooperation projects with the application sphere.

The organizational structure of Technopark consists of four main sections:

Research Department.

- o Corrosion Engineering*
- o Alumosilicate Applications*
- o Photocatalysis Group*
- o Polymers Group*
- o Analytical Chemistry Group*

CirkTech Departments

Technical Department

Director's Department

Most of the analytical analyses are provided by Technopark's own facilities, with the Central Laboratories being used for some special analyses. Technopark's analytical capabilities include:

ICP OES, XRF, XRD, FTIR, SEM + EDX, spark spectrometer, DTA, hydrogen analyser, Raman spectroscopy, X-ray spectroscopy. X-ray tomograph.

For research activities, the Technopark is fully equipped with the necessary instruments, especially corrosion chambers, analysers, test benches (tensile, compressive, bending strength, etc.). In the period under review, the Technopark was equipped with several important instruments with the help of projects under the OPPIK. These are mainly:

- SEM + EDX microscope*
- Ultraviolet radiation chamber*
- Q-SUN solar radiation simulation chamber*
- 3D x-ray microtomograph with attachments*
- XRD instrument*

For the CirkTech Čížkovice workplace:

- High-speed mill*
- Palletizing equipment*

Approximately 31FTE employees work steadily in the Technopark. Of these, 22FTE are research staff and 9FTE are technicians and staff for the operation of the site (lab technicians, cleaning, reception, maintenance, etc.).

PhD students work at the Technopark sites as part of their PhD theses, but all of them have full (part)-time jobs as employees. They are involved in both grant projects and commercial activities, where they gain not only professional experience but also practical experience in transferring results into practice and experience in negotiating with customers.

The administrative activities (HR, accounting, supply, BOPR) are carried out in collaboration with the Rectorate.

At the time of the covid pandemic, Technopark was significantly involved in the preparation of disinfectant solutions. In total, more than 36,000l of disinfection was produced and distributed in 2020, satisfying more than 150 customers.

Table 3.1.1 - Staffing per FTE²

| Academic/ Professional position | Total / Of which women | | 2021 | 2022 | 2023 | Total |
|--|------------------------|------------|-------------|-------------|-------------|--------------|
| | 2019 | 2020 | | | | |
| Professor | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Associate Professor | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Assistant Professor | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Assistant | 0 / 0 | 0 / 0 | 0,8 / 0,8 | 0 / 0 | 0 / 0 | 0,8 / 0,8 |
| R&D Personnel ³ | 21 / 7,6 | 22,3 / 9,1 | 21,3 / 7,1 | 21,3 / 6,5 | 22,4 / 9,3 | 108,3 / 39,6 |
| Researchers in other categories ⁴ | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Technical and economic staff ⁵ | 9,7 / 5,7 | 8,7 / 4,7 | 9,3 / 5,8 | 8,1 / 4,1 | 9,1 / 4 | 44,9 / 24,3 |
| Scientific, research and development staff involved in teaching activities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Early career researchers ⁶ | 0 / 0 | 4,4 / 2,4 | 2,9 / 0,9 | 3,5 / 1,4 | 3,7 / 0,7 | 14,5 / 5,4 |
| Total ⁷ | 30,7 / 13,3 | 31 / 13,8 | 31,4 / 13,7 | 29,4 / 10,6 | 31,5 / 13,3 | 154 / 64,7 |

² The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

³ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁴ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁵ Who participates in the management and support of R&D&I in the institution.

⁶ See Definition of Terms in Methodology HEI2025+.

⁷ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

3.1.2 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2019 (numbers of physical employees and personnel)⁸

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|----------|-----------------|----------|-----------------|----------|-----------------|----------|-----------------|----------|--------------------|----------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Associate Professor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Assistant Professor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Assistant | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ⁹ | 2 | 2 | 8 | 3 | 4 | 1 | 7 | 4 | 4 | 0 | 0 | 0 |
| Researchers in other categories ¹⁰ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹¹ | 0 | 0 | 2 | 1 | 4 | 2 | 2 | 1 | 0 | 0 | 0 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹² | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total¹³ | 2 | 2 | 10 | 4 | 8 | 3 | 9 | 5 | 4 | 0 | 0 | 0 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D Personnel, Researchers in other categories and Technical and economic staff are mutually exclusive, i.e. one staff member is reported in only one category. The categories of scientific, research and development staff involved in teaching activities and early career researchers are reported collectively for all the above-mentioned categories.

3.1.3 Age structure of R&D&I personnel of the evaluated unit and their structure by job title and gender in the year 2023 (numbers of physical employees and personnel)¹⁴

⁸ The total number of employees/workers as of 31st December of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁰ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹¹ Who participates in the management and support of R&D&I in the institution.

¹² See Definition of Terms in Methodology HEI2025+.

¹³ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I Personnel, Researchers in other categories and technical and economic staff.

¹⁴ The total number of employees/workers as at 31.12. of the calendar year in question is to be entered, irrespective of the level of time worked, but only in an employment relationship (including agreement on work activity, excluding agreement on work performance). Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

| Academic/ professional position | Under 29 years | | 30-39 years old | | 40-49 years old | | 50-59 years old | | 60-69 years old | | 70 years and older | |
|--|----------------|----------|-----------------|----------|-----------------|----------|-----------------|----------|-----------------|----------|--------------------|----------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Associate Professor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Assistant Professor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Assistant | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R&D Personnel ¹⁵ | 7 | 5 | 8 | 3 | 3 | 1 | 5 | 2 | 3 | 0 | 0 | 0 |
| Researchers in other categories ¹⁶ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Technical and economic staff ¹⁷ | 1 | 0 | 1 | 0 | 3 | 2 | 3 | 1 | 2 | 0 | 0 | 0 |
| Scientific, research and development staff involved in teaching activities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Early career researcher ¹⁸ | 1 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total¹⁹ | 8 | 5 | 9 | 3 | 6 | 3 | 8 | 3 | 5 | 0 | 0 | 0 |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, R&D personnel, researchers in other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Table 3.1.4 – Students - **NOT APPLICABLE**

| Type of study | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Undergraduate | | | | | | | | | | | | |
| Master's ²⁰ | | | | | | | | | | | | |
| Doctoral | | | | | | | | | | | | |
| Lifelong Learning Courses | | | | | | | | | | | | |
| Total | | | | | | | | | | | | |

¹⁵ The category "R&D Personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁶ The category "Researchers in other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁷ Who participates in the management and support of R&D&I in the institution.

¹⁸ See Definition of Terms in Methodology HEI2025+.

¹⁹ Total is the sum of the categories: professor, associate professor, assistant professor, assistant, R&I personnel, researchers in other categories and technical and economic staff.

²⁰ All master's degree students are listed, regardless of the length of their programme of study.

Table 3.1.5 - Study programmes in Czech/English - **NOT APPLICABLE**

| Type of study programme | Total ²¹ / Of which professional study programmes | | | | | | | | | | | |
|---------------------------|--|--|------|--|------|--|------|--|------|--|-------|--|
| | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | Total | |
| Undergraduate | | | | | | | | | | | | |
| Master's | | | | | | | | | | | | |
| Doctoral | | | | | | | | | | | | |
| Lifelong Learning courses | | | | | | | | | | | | |
| Total | | | | | | | | | | | | |

Note: For each SP type, enter the number of SPs in Czech language in the first cell and insert the number of SPs in English language after the slash in the same cell (e.g. 15/3), enter the number of professional SPs in Czech language in the second cell and insert the number of professional SPs in English language after the slash. Follow a similar procedure in the last column of the table (Total).

3.1.6 – R&D&I capacities

| R&D&I field | FORD | FORD share [%] | Predominant type of research | Total share of industry group [%] |
|--------------------------------|---|----------------|------------------------------|-----------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | | Zvolte položku. | |
| | 1.2 Computer and information sciences | | Zvolte položku. | |
| | 1.3 Physical sciences | | Zvolte položku. | |
| | 1.4 Chemical sciences | | Zvolte položku. | |
| | 1.5 Earth and related environmental sciences | | Zvolte položku. | |
| | 1.6 Biological sciences | | Zvolte položku. | |
| | 1.7 Other natural sciences | | Zvolte položku. | |
| 2. Engineering and Technology | 2.1 Civil engineering | | Zvolte položku. | 100 % |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | | Zvolte položku. | |
| | 2.3 Mechanical engineering | | Zvolte položku. | |
| | 2.4 Chemical engineering | 30 % | Applied Research | |
| | 2.5 Materials engineering | 60 % | Applied Research | |
| | 2.6 Medical engineering | | Zvolte položku. | |
| | 2.7 Environmental engineering | 10 % | Applied Research | |
| | 2.8 Environmental biotechnology | | Zvolte položku. | |
| | 2.9 Industrial biotechnology | | Zvolte položku. | |
| | 2.10 Nanotechnology | | Zvolte položku. | |
| | 2.11 Other engineering and technologies | | Zvolte položku. | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | | Zvolte položku. | |
| | 3.2 Clinical medicine | | Zvolte položku. | |
| | 3.3 Health sciences | | Zvolte položku. | |

²¹ The total number of study programmes for which admissions have been announced in a given academic year.

| | | | | |
|---|--|-------|-----------------|-------|
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | | Zvolte položku. | |
| | 4.2 Animal and Dairy science | | Zvolte položku. | |
| | 4.3 Veterinary science | | Zvolte položku. | |
| | 4.4 Other agricultural sciences | | Zvolte položku. | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | | Zvolte položku. | |
| | 5.2 Economics and Business | | Zvolte položku. | |
| | 5.3 Education | | Zvolte položku. | |
| | 5.4 Sociology | | Zvolte položku. | |
| | 5.5 Law | | Zvolte položku. | |
| | 5.6 Political science | | Zvolte položku. | |
| | 5.7 Social and economic geography | | Zvolte položku. | |
| | 5.8 Media and communications | | Zvolte položku. | |
| | 5.9 Other social sciences | | Zvolte položku. | |
| 6. Humanities and the Arts | 6.1 History and Archaeology | | Zvolte položku. | |
| | 6.2 Languages and Literature | | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | | Zvolte položku. | |
| | 6.4 Arts (arts, history of arts, performing arts, music) | | Zvolte položku. | |
| | 6.5 Other Humanities and the Arts | | Zvolte položku. | |
| Total | | 100 % | - | 100 % |

RECOGNITION BY THE RESEARCH COMMUNITY

3.2 Recognition by the research community

The evaluated unit will briefly comment on its position in the research community. It shall consider individual and other prestigious R&D&I awards, participation of its academic staff in the editorial boards of international scientific journals, elected membership in professional societies, major invited lectures given by the evaluated unit's academic staff abroad or by foreign scientists and other relevant guests at the evaluated unit. Additionally, it will address the involvement of staff in the evaluation of national or European project/programme calls over the period of 2019–2023 based on the data provided in annex tables 3.2.1 to 3.2.5 (max. 10 most relevant items). If necessary, the evaluated unit shall list any additional services to the scientific community that it considers relevant.

Maximum 1000 words.

Self-assessment:

The position of the Kralupy Technopark in the research community is significant because it operates as a key platform for applied research and innovation in materials research and related fields. Its focus is on bridge between academic research and commercial applications.

Key aspects of its position:

1. Research and development activities:

Technopark specialises in applied research and development of new technologies and materials, mainly in the field of building chemistry and temperature resistant materials. This activity is focused on innovations that can contribute to technological progress not only in the civil engineering sector.

2. Cooperation between academia and industry:

The Technopark creates a bridge between academic institutions, such as VŠCHT, and industry. It offers an infrastructure for the realisation of research projects, which helps to apply scientific knowledge in practice. This is mainly corrosion engineering, where the group of corrosion engineers working in the Technopark has a very broad field of application across Europe.

3. Support for start-ups and innovation:

It offers space for start-ups and research teams that focus on developing new products and technological solutions. This contributes to the development of an innovation ecosystem in the field of building materials and chemical products.

4. Materials testing and certification:

Technopark provides testing and certification services for building materials, making it an important player in product quality assurance and in supporting the introduction of new materials into the market.

Table 3.2.1 - Prestigious R&D&I awards granted during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the award | Awarding institution |
|---|--|--|
| Milan Petrák, Ing. | The Visionaries 2022 Project Personality | CzechInno |
| Tomáš Prošek, doc. Ing. Ph.D. | Guest Professor | University of Science and Technology Beijing |
| David Kubička, prof. Ing. PhD. MBA | President of the European Federation of Catalysis Societies (EFCATS) | Elected by the representatives of the national catalysis societies for 2 years at the EFCATS council meeting in 2023 |
| | | |

Note: Provide up to 10 examples.

Table 3.2.2 Participation of academic staff of the evaluated unit in editorial boards of international scientific journals during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of scientific journal, ISSN |
|---|--|
| Tomáš Prošek, doc. Ing. Ph.D. | Protection Against Corrosion / Ochrona Przed Korozją, ISSN 0473-7733 |
| | Surface Technology, ISSN 1001-3660 |
| | Metals, ISSN 2075-4701 |
| | Corrosion Protection, ISSN 2282-1767 |
| David Kubička, prof. Ing. PhD. MBA | Sustainable Chemistry for the Environment, 2949-8392 |
| | Catalysts, 2073-4344 |

Note: Please provide up to 10 examples of academic staff participation in editorial boards of international scientific journals (e.g. editor, editorial board member, etc.).

Table 3.2.3 The most important invited lectures delivered by the academic staff of the evaluated unit at foreign institutions during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Invited lecture title | Name of host institution, or name of conference or event | Year |
|---|--|--|------|
| Tomáš Prošek, doc. Ing. Ph.D. | Performance of coil-coated materials in deformed and overlap areas | 57th ECCA Autumn Congress, Brussels, Belgium | 2023 |
| | Understanding into properties controlling durability of pre-painted steel sheets | 19th Asian Pacific Corrosion Control Conference (APCCC), Guangzhou, China | 2023 |
| | Selection of optimal corrosion tests in view of degradation mechanisms of organic coatings | GfKORR – Gesellschaft für Korrosionsschutz e.V., Berlin, Germany | 2023 |
| | Performance of coil-coated materials in deformed and overlap areas | 5th International Symposium Corrosion of Pre-painted Materials, Stockholm, Sweden | 2023 |
| | Car safety and hydrogen embrittlement of high strength steels induced by atmospheric corrosion | International Congress on Materials Degradation and Protection (ICMDP), Beijing, China | 2023 |

| | | | |
|------------------------------------|---|---|------|
| | Understanding into Accelerated Corrosion Tests through Real Time Corrosion Monitoring | International Conference on Corrosion Protection and Application (ICCPA), Chongqing, China | 2023 |
| | When atmospheric corrosion takes place? On the effect of relative humidity and formation of surface water film on corrosion | PRAKTIKOR Conference of PSK, Josefow, Poland | 2022 |
| | Real-time monitoring of air corrosivity by electrical resistance technique | 3rd Annual Conference on Equipment Health Intelligent Diagnosis and Safety, China, virtual event | 2021 |
| David Kubička, prof. Ing. PhD. MBA | Biomass-derived fuels and chemicals by aldol condensation | Stockholm University, Sweden | 2019 |
| | Catalytic upgrading of Biomass | Heilongjiang University, Harbin, China | 2019 |
| | New Developments in the Direct Conversion of Lipids into Hydrocarbons | 5th European Conference on Green and Sustainable Chemistry, Greece (on-line) | 2021 |
| | Valorization Relying on Aldol Condensation and Deoxygenation | 6th International School-Conference on Catalysis for Young Scientists - Catalyst Design: From Molecular to Industrial Level, Boreskov Institute of Catalysis, Novosibirsk, Russia (on-line) | 2021 |
| | Biomass-Derived Fuels and Chemicals by Aldol Condensation | 5th International Conference Catalysis for Renewable Sources: Fuel, Energy, Chemicals (CRS-5), Agios Nikolaos, Crete, Greece, | 2019 |
| | Biomass-Derived Fuels and Chemicals by Aldol Condensation | 51st Polish Annual Conference on Catalysis, Krakow, Poland | 2019 |
| | The role of heterogeneous catalysis in future biorefineries | RRB2023 – 19th International Conference on Renewable Resources and Biorefineries, Riga, Latvia | 2023 |

Note: Provide up to 10 examples.

Table 3.2.4 - The most important lectures by foreign scientists and other guests relevant to R&D&I at the evaluated unit during the evaluation period

| Name, surname and title(s) of the lecturer | Lecturer's employer at the time of the lecture | Invited lecture title | Year |
|--|--|-----------------------|------|
| | | | |
| | | | |
| | | | |

Note: Provide up to 10 examples.

Table 3.2.5 - Involvement in the evaluation of national/European research project/programme calls relevant to the R&D&I area at the unit during the evaluation period

| Name, surname and title(s) of the evaluated unit's staff member | Name of the research project/programme call | Name of the contracting authority/guarantor of the project/programme call | Year |
|---|---|--|------------------|
| Milan Petrák, Ing. | Expert advisory board for the evaluation of research organisations under the competence of the Ministry of Industry and Trade | Ministry of Industry and Trade | 2019 - 2022 |
| Tomáš Prošek, doc. Ing. Ph.D. | Coal and Steel Technical Group TGA 3 Conception of Steel Products | European Research Executive Agency (REA) | 2023 |
| | Trend, Théta, Sigma, NCK | Technological Agency of the Czech Republic | 2020–2023 |
| | Support of Science and Research | The Moravian-Silesian Region | 2019, 2021, 2022 |
| | Inter-Excellence | Ministry of Education, Youth and Sports of the Czech Republic | 2019, 2022 |
| | EU Structural and Cohesion Fund 2014-2020 | The Central Finance and Contracting Agency of Latvia | 2020 |
| Václav Šefl, Ing. Ph.D | Trend, Théta, Doprava2020+ | Technological Agency of the Czech Republic | 2022, 2023 |
| David Kubička, prof. Ing. Ph.D. MBA | Czech Science Foundation | Czech Science Foundation, Panel P106 | 2017-2021 |
| | Technology Agency of the Czech Republic | Technology Agency of the Czech Republic, Panel 4 | 2014-2021 |
| | Horizon Europe | Horizon Europe | 2020 |
| | SASPRO 2 | Programme of the Slovak Academy of Sciences, Comenius University in Bratislava and Slovak University of Technology in Bratislava | 2021 |
| | AAPG 2023 | ANR (Agence Recherche), France | 2023 |

Note: Provide up to 10 examples.

RESEARCH PROJECTS

3.3 Research projects

The evaluated unit shall list at most 10 (considered most significant by the evaluated unit) research projects/activities (regardless of whether they are supported by public funds or based on contract research²²) that it has implemented or participated in during the period of 2019–2023²³. This should be done from the full list in annex tables (Table 3.3.1-3.3.2)²⁴, regarding particularly the results achieved or the application potential of the projects. The unit should also describe how the research projects contributed to the mission and purpose of the evaluated unit. If the evaluated unit has been a participant in listed project, it shall indicate which other entities were involved and describe its contribution to the project. The interdisciplinary aspects of the projects will also be commented on, along with any collaboration with other units of the evaluated HEI.

Maximum 300 words per project.

Self-assessment:

TA ČR – Technology Agency of the Czech Republic

MIT – Ministry of Industry and Trade

MŠMT – Ministry of Education, Youth and Sports

OP PIK - Operational Programme Entrepreneurship and Innovation for Competitiveness

Projects with public support

- 1) TAČR EPSILON Development of a primary mould manufacturing method for the production of moulds for ceramic pressure casting

TH04020462 (2015 - 2020)

Applicant: Dřevojas, výrobní družstvo

Partners: University of Chemical Technology in Prague

The subject of the project is a method of production of a primary mould /equipment/ into which moulds used for die-casting of ceramics are cast. Within the project two independent methods were developed - (i) to develop the material from which the mould will be produced by milling, (ii) to develop a procedure for the application of 3D printing in the production of primary moulds. Technopark involvement: Finding suitable polymer materials with respect to product quality and raw material cost. Formulation of polymer composition, testing at laboratory scale. Participation in field trials.

- 2) MŠMT LT - INTER-EXCELLENCE Cooperative R&D of Innovative catalytic upgrading and technology for efficient transformation of vegetable oil to clean fuels

LTACH19017 (2016-2021)

The aim of the project was to develop, in collaboration with a catalyst manufacturer (Ranido) and Chinese partners with complementary know-how, a catalytic system to enable the conversion of triglycerides to advanced biofuels under more favourable reaction conditions than those applied in current technologies. Part of this objective is to develop the catalytic system to be flexible in

²² For the definition of contract research for the purposes of evaluation in the HE segments, see Article 2.2.1 of the Community Framework for State Aid for Research, Development and Innovation 2014/C 198/01.

²³ Regardless of whether the projects are completed or still ongoing, provided that at least part of the project was implemented during the evaluation period.

²⁴ The evaluated unit shall only fill tables that are relevant to it.

terms of end products, i.e. to allow the production of fatty alcohols in addition to advanced biofuels. The achievement of this objective is conditional on the achievement of the sub-objectives of the project, which are the development of an efficient hydrogenolysis catalyst to ensure the selective conversion of triglycerides (vegetable oils) into a mixture of fatty alcohols and the development of an isomerisation catalyst to transform mixtures of fatty alcohols into mixtures of isoalkanes. The first sub-objective will be the main focus of the research team in the Czech Republic, while the provision of the second sub-objective will be the responsibility of the research team in the Czech Republic. By integrating both sub-objectives, it will then be possible to achieve the main objective of the project, i.e. the development of a flexible catalytic system for the conversion of triglycerides.

Applicant: University of Chemical Technology in Prague

Partners: Ranido, s.r.o.

Involvement of Technopark: Synthesis and characterization of partial catalysts. Testing of catalysts on a laboratory unit.

- 3) MIT OP PIK Research and development of new plates and 3D moldings using expanded vermiculite

CZ.01.1.02/0.0/0.0/19_262/0020042 (2020 - 2022)

The subject of the project was the research and development of new plates and 3D mouldings containing vermiculite, which will exceed the technical characteristics of existing products. This has ensured that the company is able to compete against the main competitors in the world. There is no similar solution in this form yet and the high prices of foreign competitors should give the applicant a chance to succeed with the new solution. The project will result in 5 prototypes (4 types of new boards + 3D mouldings).

Applicant: Grena, a.s.

Partners: University of Chemical Technology in Prague

Involvement of Technopark:

Formulation of vermiculite mixtures, analytics of feedstock, mechanical testing of properties of laboratory samples and products, participation in operational experiments.

- 4) MIT OP PIK Application of recycled zinc in anticorrosive coating systems
CZ.01.1.02/0.0/0.0/19_262/0020078 (2020 - 2022)

The project focused on research and development of innovative coatings using exclusively recycled zinc powders, in accordance with the principles of circular economy.

Applicant: COREZINC s.r.o.

Partners: University of Chemical Technology in Prague

Involvement of Technopark: formulation of coating formulations, testing of their mechanical properties and assessment of their anticorrosive performance.

- 5) MIT OP PIK 3D SANDPRINT - New inorganic binder additive technology for production of foundry cores

CZ.01.1.02/0.0/0.0/20_321/0023613 (2020-2023)

The subject of the project was the research and development of an inorganic binder to enable the production of cores by 3D printing technology in the foundry industry. The target parameter in terms of the strength of the core produced by 3D printing is the flexural strength, which must be at least 3.5 MPa, so not only the material properties but also its structure were investigated. The research also looked at ensuring the long-term shelf life of cores with an inorganic binder.

Applicant: SAND TEAM, spol. s r.o.

Partners: F O C A M spol. s r.o.

University of Chemical Technology in Prague' 17 September 2020 - 30 May 2023

Involvement of Technopark: Selection of suitable raw materials for their analytical analysis.

Formulation of recipes for mixtures. Testing of mechanical properties, monitoring of long-term storability of materials.

- 6) MIT OP PIK Tile ceiling module system for air cleaning with photocatalytic and antimicrobial function

CZ.01.1.02/0.0/0.0/21_374/0026732 (2022 - 2023)

The aim of the project was to develop a suspended ceiling module system for room air purification.

The basis of the module is foam ceramics coated with a functional coating with photocatalytic function, which under UV lighting can break down harmful pollutants and microbial agents.

Applicant: LANIK s.r.o.

Partners: University of Chemical Technology in Prague

Involvement of Technopark: Preparation of photocatalytically active surfaces on foamed ceramics, testing of their efficiency, cooperation in realization of the prototype.

- 7) MIT OP PIK Development of inorganic hardeners for foundry self-hardening mixtures with inorganic binder

CZ.01.1.02/0.0/0.0/16_084/0010119 (2017 - 2020)

The main objective of the project was research and development of a new technology of foundry moulds made of self-setting mixtures using a geopolymer binder system. The project focused on acquiring the knowledge needed for the development of innovative technology through the implementation of industrial research and experimental development. The results obtained resulted in the introduction of a new technology of foundry moulds that have the potential to be used in world markets.

Applicant: SAND TEAM, spol. s r.o.

Partners: F O C A M spol. s r.o.

University of Chemical Technology in Prague

Involvement of Technopark: Selection of suitable raw materials, their analytics. Formulation of suitable mixtures and their optimization, testing of the resulting mechanical properties.

- 8) TA ČR TREND Development of devices for corrosion monitoring in atmosphere

FW01010482 (2020 - 2023)

The aim of the project was to develop a miniature automated device for measuring the effective corrosivity of the atmosphere for use in the automotive, pulp and paper and construction industries, for monitoring conditions during transport, for indoor air quality control in cultural monuments, for research purposes and other applications. The device works on the principle of measuring small changes in electrical resistance in a thin layer of metal. The actual corrosion rate of a suitably selected metal or metals determined from the resistance changes will provide information on the corrosivity of the environment. The data is wirelessly transmitted to a server which processes it in real time and informs the user via selected channels about the current situation. The user can thus react immediately when corrosivity increases above a selected critical limit. Production of these devices is currently started.

Applicant: GEMA, a.s.

Partners: University of Chemical Technology in Prague

Technopark involvement: Design of test probes, their construction and testing. Cooperation in the development and testing of control software

- 9) MIT TRIO Research and development of the use of recycled materials in the production of porous polymer mould

FV40392 (2019 - 2021)

The project has been developing formulations of porous polymeric material for use in the production of moulds for pressure casting of sanitary ceramics, which is produced using recycled waste from mould production or using materials obtained from discarded moulds with an end-of-life from the production of sanitary ceramics. The specific objectives of the project were: (i) to develop a formulation of a new material for mould production using recyclates from past mould production (ii) to produce functional samples of real moulds made from the material with recyclates and to test them (iii) to validate the technology for the production of porous moulds for pressure casting of sanitary ware with recyclates. The developed formulations contain at least 10% recyclate without affecting the properties of the material and the possibility of controlling its structure, especially the pore size.

Applicant: Dřevojas, výrobní družstvo

Partners: VÚTS, a.s.

University of Chemical Technology in Prague

Involvement of Technopark: Design and testing of recipes with the addition of recyclates, mechanical tests, preparation of recipes for their production.

Commercial projects

- 10) A long-term collaboration with the International Climbing and Mountaineering Federation (UIAA) based in Switzerland led to development of the UIAA 123 standard, which was approved in December 2020. The document defines requirements on corrosion resistance of permanent rock anchors to ensure 50 years of the safe use even in the most corrosive environments. Technopark Kralupy is the only laboratory in the world certified to test climbing anchors following the UIAA 123 standard. From 2021 to 2024, 28 products of different producers have passed the tests and obtained the UIAA Safety Label.

Table 3.3.1 Projects supported by public funds

| In the role of beneficiary | | | | | | |
|--|---|--------------------------------|-------------------|-------------------|-------------------|--------------------|
| Provider ²⁵ | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Recycled aluminium alloy coatings with chemically tailored electrochemical potential for safe protection of steel structures | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 10731 / 423 |
| European comission | | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 10731 / 423 |
| GACR | Investigation and optimization of promoted CuZnAl hydrogenation catalysts | 2186 / 86 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Role of microstructure in hydrogen assisted corrosion degradation of high strength steels | 2244 / 89 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GACR | Quantifying the basicity of reconstructed layered double hydroxides and correlating this with their performance in base-catalysed reactions | 2828 / 112 | 2921 / 115 | 2921 / 115 | 0 / 0 | 0 / 0 |
| GACR | Simultaneous deoxygenation of acids and phenols in pyrolyzed wastewater sludges | 0 / 0 | 2236 / 88 | 2352 / 93 | 2417 / 95 | 0 / 0 |
| GACR | Supported Cu-based catalysts for hydrogenolysis | 0 / 0 | 2112 / 83 | 2203 / 87 | 2303 / 91 | 0 / 0 |
| GACR | Controlling reaction pathways in hydrogenation of sugar-derived oxygenates by catalyst design | 0 / 0 | 0 / 0 | 131 / 5 | 2138 / 84 | 2178 / 86 |
| GACR | Investigation of the key factors affecting hydrogenation/deoxygenation of mixtures of oxygenates | 0 / 0 | 0 / 0 | 0 / 0 | 2875 / 113 | 2991 / 118 |
| GACR | The role of precipitates in hydrogen transport and hydrogen embrittlement of Al alloys | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 3100 / 122 |
| GACR | | 7258 / 286 | 7269 / 287 | 7607 / 300 | 9733 / 384 | 8269 / 326 |
| Ministry of Education, Youth and Sports | Cooperative R&D of Innovative catalytic upgrading and technology for efficient transformation of vegetable oil to clean fuels | 2192 / 86 | 2236 / 88 | 2221 / 88 | 0 / 0 | 0 / 0 |
| Ministry of Education, Youth and Sports | | 2192 / 86 | 2236 / 88 | 2221 / 88 | 0 / 0 | 0 / 0 |
| TACR | Determination of limit hydrogen concentration in a mixture with natural gas for safe use of underground gas storage facilities | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 4333 / 171 |
| TACR | | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 4333 / 171 |
| TOTAL | | 9450 / 373 | 9505 / 375 | 9828 / 388 | 9733 / 384 | 23333 / 920 |

| In the role of another participant | | | | | | |
|---------------------------------------|--|--------------------------------|-----------------|------------------|------------------|-------------------|
| Provider ²⁵ | | Support (in thousands CZK/EUR) | | | | |
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| European comission | Reliable Bio-based Refinery Intermediates | 2243 / 88 | 818 / 32 | 290 / 11 | 297 / 12 | 0 / 0 |
| European comission | Modelling of hydrogen activity from atmospheric corrosion in ultra-high strength steels for light structure application | 0 / 0 | 0 / 0 | 289 / 11 | 1700 / 67 | 2433 / 96 |
| European comission | Hydrogen embrittlement resistant new steel links solutions for off-shore wind turbines | 0 / 0 | 0 / 0 | 0 / 0 | 362 / 14 | 2002 / 79 |
| European comission | | 2243 / 88 | 818 / 32 | 579 / 22 | 2359 / 93 | 4435 / 175 |
| Ministry of Industry and Trade | Development of filling and closing monoblock for filling corrosive substances | 1685 / 66 | 357 / 14 | 2042 / 81 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Research of new technology of foundry molds from the self-hardening mixture using geopolymers binder system. | 406 / 16 | 212 / 8 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | Development of a catalyst for the decomposition of hydrogen peroxide in the gas phase | 490 / 19 | 788 / 31 | 0 / 0 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | USE OF THERMOPLASTICS TO EXTEND THE LIFE OF METAL CONTAINERS FOR INDUSTRY | 0 / 0 | 0 / 0 | 0 / 0 | 2361 / 93 | 1290 / 51 |
| Ministry of Industry and Trade | Research and development of new plates and 3D moldings using expanded vermiculite | 0 / 0 | 747 / 29 | 0 / 0 | 864 / 34 | 1969 / 78 |
| Ministry of Industry and Trade | Application of recycled zinc in anticorrosive coating systems | 0 / 0 | 878 / 35 | 0 / 0 | 1945 / 77 | 1409 / 56 |
| Ministry of Industry and Trade | 3D SANDPRINT - New inorganic binder additive technology for production of foundry cores | 0 / 0 | 116 / 5 | 955 / 38 | 1387 / 55 | 1203 / 47 |
| Ministry of Industry and Trade | Filled porous inorganic coatings for special applications | 0 / 0 | 0 / 0 | 211 / 8 | 394 / 16 | 259 / 10 |
| Ministry of Industry and Trade | Development of environmentally friendly hydrogenation catalysts | 530 / 21 | 1062 / 42 | 1062 / 42 | 546 / 22 | 0 / 0 |
| Ministry of Industry and Trade | Research and development of the use of recycled materials in the production of porous polymer mould | 1754 / 69 | 2591 / 102 | 1629 / 64 | 0 / 0 | 0 / 0 |
| Ministry of Industry and Trade | GRENA, a.s. - Application 1 - Chemically bonded, hydrophobized vermiculite board | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 167 / 7 |
| Ministry of Industry and Trade | ZincTechPaint; Research, development and validation of a new technology for the production of anti-corrosion coatings from secondary raw materials | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1120 / 44 |

| | | | | | | |
|---------------------------------------|---|-------------------|--------------------|--------------------|--------------------|--------------------|
| Ministry of Industry and Trade | Development of technology for surface condition optimization of special high-alloy materials | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 699 / 28 |
| Ministry of Industry and Trade | Development of inorganic hardeners for foundry self-hardening mixtures with an inorganic binder | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 988 / 39 |
| Ministry of Industry and Trade | A comprehensive solution for extending the life of molds for high-pressure casting of sanitary ceramics | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 737 / 29 |
| Ministry of Industry and Trade | Tile ceiling module system for air cleaning with photocatalytic and antimicrobial function | 0 / 0 | 0 / 0 | 0 / 0 | 814 / 32 | 586 / 23 |
| Ministry of Industry and Trade | GLOBAL JET | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 362 / 14 |
| Ministry of Industry and Trade | | 4865 / 192 | 6750 / 266 | 5899 / 233 | 8310 / 328 | 10789 / 426 |
| TACR | Photocatalytic air purifying and recuperating unit | 0 / 0 | 2059 / 81 | 2101 / 83 | 2142 / 84 | 0 / 0 |
| TACR | Development of devices for corrosion monitoring in atmosphere | 0 / 0 | 3034 / 120 | 3036 / 120 | 3400 / 134 | 2482 / 98 |
| TACR | Development of a primary mould manufacturing method for the production of moulds for ceramic pressure casting | 2821 / 111 | 3001 / 118 | 0 / 0 | 0 / 0 | 0 / 0 |
| TACR | | 2821 / 111 | 8095 / 319 | 5137 / 203 | 5542 / 219 | 2482 / 98 |
| TOTAL | | 9929 / 392 | 15663 / 618 | 11614 / 458 | 16212 / 640 | 17706 / 700 |

Table 3.3.2 - Contract research activities

| Client ²⁵ | Activity name | Revenue (in thousands CZK/EUR) | | | | |
|---|--|--------------------------------|----------|-----------|----------|---------|
| | | 2019 | 2020 | 2021 | 2022 | 2023 |
| "MENADZER" D.O.O. LU [BIH] | Accelerated corrosion test of metal | 75 / 3 | 0 / 0 | 76 / 3 | 0 / 0 | 76 / 3 |
| AC&CS (CRM GROUP) Quartier Polytech [BEL] | Continuation of exposure up to 6 ye Research project "Long term perform Research project Long term performa | 974 / 39 | 0 / 0 | 2328 / 93 | 429 / 17 | 0 / 0 |
| ANKOR S.C. ANNA CIES [POL] | Accelerated corrosion testing | 0 / 0 | 62 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| AUSTRIALPIN IMMOBILI [AUT] | Corrosion resistance testing and ce | 0 / 0 | 0 / 0 | 0 / 0 | 8 / 0 | 0 / 0 |
| CA.TI. - CARNICA TIR [ITA] | Assessment of Wax 2832 properties a Testing of wax grease following ord | 0 / 0 | 0 / 0 | 0 / 0 | 46 / 2 | 0 / 0 |
| CEST KOMPETENZZENTRU [ITA] | Study of the effect of coating Suplhur dioxide test | 0 / 0 | 0 / 0 | 0 / 0 | 848 / 34 | 0 / 0 |
| CVARIO LTD, ODSTEPNY | Neutral Salt Spray Test | 0 / 0 | 0 / 0 | 0 / 0 | 21 / 1 | 0 / 0 |
| DESIGN ERICK VAN EGE [NLD] | Literature review | 0 / 0 | 0 / 0 | 15 / 1 | 0 / 0 | 0 / 0 |
| FERNO SLOVAKIA S.R.O [SLO] | Accelerated corrosion test | 9 / 0 | 9 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| FIXE CLIMBING SL [ESP] | Corrosion resistance testing | 0 / 0 | 0 / 0 | 0 / 0 | 35 / 1 | 0 / 0 |
| HOLCIM (CESKO), A.S. | Clacination of clay | 0 / 0 | 0 / 0 | 0 / 0 | 275 / 11 | 0 / 0 |
| INSTITUT CORROSION [FRA] | Exposure of two sets of 140 flat metal Exposure programme of metal sheet Literature review Preparation of series of Zn-2Al-2Mg | 235 / 9 | 580 / 23 | 0 / 0 | 78 / 3 | 16 / 1 |
| INTERNATIONAL CLIMBI [CHE] | Corrosion resistance testing Testing of UV stability of textile | 282 / 11 | 136 / 5 | 0 / 0 | 246 / 10 | 19 / 1 |
| JULIUS BLUM GMBH [AUT] | Mass gain and mass loss Testing of hinges in NSS and AASS Verification of corrosivity in NSST | 0 / 0 | 0 / 0 | 82 / 3 | 67 / 3 | 199 / 8 |
| LAPPAS S.A. [GRC] | Corrosion resistance testing | 0 / 0 | 0 / 0 | 0 / 0 | 50 / 2 | 25 / 1 |

²⁵ If the client is from abroad, indicate in brackets the country of origin of the client.

| | | | | | | |
|---|--|----------|----------|---------|----------|----------|
| | Chemical analysis of stainless steel | | | | | |
| NESTE OYJ [FIN] | Expert services | 0 / 0 | 0 / 0 | 131 / 5 | 0 / 0 | 0 / 0 |
| PFEIFER STRUCTURES [AUT] | 4x JIS TEST | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 49 / 2 |
| RISE RESEARCH INSTIT [SWE] | Exposure of samples in soil | 0 / 0 | 0 / 0 | 0 / 0 | 655 / 26 | 37 / 1 |
| RWE GAS STORAGE WEST | Assessment of corrosion resistance WTB Engineeringleistungen GLNG - As | 0 / 0 | 0 / 0 | 0 / 0 | 44 / 2 | 25 / 1 |
| SAS APAVE EXPLOITATION [FRA] | UIAA 123 test of anchors | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 25 / 1 |
| SASU APAVE SUDEUROPE ZAC SAUMATY SEON [FRA] | Classification of climbing anchor | 0 / 0 | 0 / 0 | 0 / 0 | 33 / 1 | 0 / 0 |
| UNIVERSIDAD DE SANTI Escuela de Arquitectura Laboratorio de Exploración en Materiales Arquitectónicos [CHL] | Test of material surface | 0 / 0 | 0 / 0 | 0 / 0 | 18 / 1 | 0 / 0 |
| UNIWIERSYTET MIKOLAJA [POL] | Test of material surface | 0 / 0 | 0 / 0 | 68 / 3 | 0 / 0 | 0 / 0 |
| U-SHIN EUROPE KFT. [HUN] | Accelerated cyclic corrosion test | 0 / 0 | 0 / 0 | 52 / 2 | 0 / 0 | 0 / 0 |
| DONALDSON EUROPE BVB [BEL] | 1000 hours of NSST according to ISO | 0 / 0 | 7 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| HOLCIM INNOVATION CENTRE [FRA] | Calcination of clay materias | 0 / 0 | 0 / 0 | 0 / 0 | 519 / 21 | 536 / 21 |
| VOESTALPINE STAHL GmbH [AUT] | H-Hunt II project In situ SKP study of the effect Preparation and analysis of materials | 859 / 34 | 866 / 35 | 0 / 0 | 0 / 0 | 218 / 9 |
| 2N TELEKOMUNIKACE A. | Corrosion tests | 29 / 1 | 61 / 2 | 28 / 1 | 29 / 1 | 0 / 0 |
| ABO VALVE, S.R.O. | Translation of expert reports Statement on the causes of corrosion damage Preparation of expert report | 60 / 2 | 12 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| ADVANEX CZECH REPUBL | Spring cleanliness testing | 0 / 0 | 0 / 0 | 20 / 1 | 24 / 1 | 24 / 1 |
| AERO VODOCHODY AEROS | Analysis of corrosion damage to discs Corrosion test in neutral salt spray | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 108 / 4 |

| | | | | | | |
|----------------------------------|--|---------|---------|--------|--------|--------|
| | Proof of corrosion on the inside | | | | | |
| AKADEMIE VED CESKE REPUBLIKYA | Tests of pressure composite vessels | 0 / 0 | 0 / 0 | 0 / 0 | 28 / 1 | 0 / 0 |
| AOYAMA AUTOMOTIVE FA | Cyclic corrosion test | 0 / 0 | 0 / 0 | 85 / 3 | 0 / 0 | 0 / 0 |
| ARKO TECHNOLOGY, A.S | Determination of material composition Determination of the causes of corrosion in pipelines | 26 / 1 | 19 / 1 | 0 / 0 | 0 / 0 | 0 / 0 |
| AS CHEMOPRAG, A.S. | Verification of corrosivity of process fluids Determination of corrosivity of process fluids | 32 / 1 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| ASTRUM LT S.R.O. | Analýzy vrstev na Si waferech | 0 / 0 | 0 / 0 | 0 / 0 | 34 / 1 | 0 / 0 |
| AV EQUEN S.R.O. | Deposit composition analysis Mixed sample analysis Determination of the effect of polyphosphate addition | 0 / 0 | 0 / 0 | 14 / 1 | 10 / 0 | 0 / 0 |
| BARVY A LAKY TELURIA | Corrosion tests | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 25 / 1 |
| BILSTEIN CEE A.S. | Analysis of surface defects in hardened tape Analysis of the origin of surface defects Analysis of the influence of climatic parameters | 128 / 5 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| BOHDAN BOLZANO, S.R.O. | Composition analysis of metal samples OES sample analysis Determination of the cause of sample failure Determination of the cause of cracking of products | 0 / 0 | 0 / 0 | 0 / 0 | 12 / 0 | 22 / 1 |
| BOCHEMIE A.S. | Determining the corrosivity of Bosch | 7 / 0 | 0 / 0 | 0 / 0 | 6 / 0 | 21 / 1 |
| BOSCH TERMOTECHNIKA | Textile resistance comparison test | 0 / 0 | 0 / 0 | 29 / 1 | 0 / 0 | 0 / 0 |
| CARGO FRAMES S.R.O. | Cyclic corrosion test | 5 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| CEPS A.S. | Design and testing of chemical cleaning agents | 125 / 5 | 137 / 5 | 0 / 0 | 0 / 0 | 0 / 0 |

| | | | | | | |
|---------------------------|--|----------|--------|----------|------------|----------|
| CESKE DRAHY, A.S. | Expertise in determining the causes of corrosion | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 134 / 5 |
| CEZ, A. S. | Testing of junction boxes | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 234 / 9 |
| CONTINENTAL AUTOMOTIVE | Accelerated Corrosion Testing | 0 / 0 | 0 / 0 | 62 / 2 | 161 / 6 | 0 / 0 |
| CVUT Fakulta stavební | Elemental and structural analysis of buildings | 41 / 2 | 17 / 1 | 41 / 2 | 0 / 0 | 0 / 0 |
| DOOSAN LENTJES CZECH | Literature research | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 38 / 2 |
| EDS TRADE S.R.O. | Resistance testing of Al profiles | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 34 / 1 |
| ECHOZ SOLUTION S.R.O. | Analysis of the causes of recovery unit damage | 0 / 0 | 0 / 0 | 0 / 0 | 20 / 1 | 0 / 0 |
| ELTEK S.R.O. | Accelerated corrosion test | 0 / 0 | 0 / 0 | 0 / 0 | 85 / 3 | 0 / 0 |
| EMK ELEKTRO S.R.O. | UVA resistance of the material | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 21 / 1 |
| EXPERTCON S.R.O. | Comparative laboratory tests | 0 / 0 | 55 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| F.X. MEILLER SLANY | Mechanical resistance testing of parts | 12 / 0 | 84 / 3 | 34 / 1 | 107 / 4 | 260 / 10 |
| FASTENAL EUROPE, S.R.O. | Accelerated corrosion tests | 13 / 1 | 7 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| FF SERVIS, S R.O | Measurement of FITR spectra | 0 / 0 | 2 / 0 | 0 / 0 | 0 / 0 | 99 / 4 |
| FUNCHEM, S.R.O. | Accelerated corrosion tests | 30 / 1 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GALVANOPLAST FISCHER | Laboratory tests of materials | 0 / 0 | 20 / 1 | 24 / 1 | 12 / 0 | 44 / 2 |
| GRENA, A.S. | Conducting research work | 399 / 16 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GUMARNY ZUBRI, A.S. | Accelerated rubber testing | 0 / 0 | 12 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| GUMOKOV, A.S. | Accelerated test | 0 / 0 | 0 / 0 | 60 / 2 | 0 / 0 | 0 / 0 |
| GZ MEDIA, A.S. | Polymer analysis | 0 / 0 | 0 / 0 | 0 / 0 | 5 / 0 | 0 / 0 |
| HANSA CESKO S.R.O. | Accelerated Corrosion Testing | 0 / 0 | 0 / 0 | 21 / 1 | 35 / 1 | 15 / 1 |
| HELIX CLEANER S.R.O. | Photocatalytic performance testing | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 30 / 1 |
| HITACHI ENERGY CZECH | Geometry measurements on cross-sectional product | 9 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 22 / 1 |
| HLAVNI MESTO PRAHA | Assessment of enamelled street covers | 0 / 0 | 31 / 1 | 0 / 0 | 0 / 0 | 0 / 0 |
| HOLCIM (CESKO), A.S. | CirkTech experiments | 0 / 0 | 0 / 0 | 0 / 0 | 4300 / 172 | 0 / 0 |
| HRIBAL ELEKTROKOVO S.R.O. | Cyclic corrosion tests | 95 / 4 | 38 / 2 | 284 / 11 | 0 / 0 | 0 / 0 |
| IC PRAHA, S.R.O. | Corrosion tests | 17 / 1 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |

| | | | | | | |
|----------------------------|--|----------|----------|----------|----------|---------|
| INDUSTRY COATS CZ, S.R.O. | Determination of the degree of resistance of the coating | 0 / 0 | 117 / 5 | 0 / 0 | 0 / 0 | 0 / 0 |
| IRISA, VYROBNI DRUZSTVO | Testing of 4 types of plated materials | 0 / 0 | 0 / 0 | 0 / 0 | 16 / 1 | 0 / 0 |
| ITALINOX S.R.O. | Assessment of the cause of the attack of Al pans | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 12 / 0 |
| JOSEF VAJC | Formulation of a paint stripper | 0 / 0 | 10 / 0 | 260 / 10 | 245 / 10 | 0 / 0 |
| JUTA A.S. | Testing the durability of samples | 0 / 0 | 0 / 0 | 20 / 1 | 0 / 0 | 0 / 0 |
| KALIBRACNI LABORATOR | Analysis of the surface finish of the intake throat | 22 / 1 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| KOITO CZECH S.R.O. | Accelerated corrosion test | 0 / 0 | 0 / 0 | 76 / 3 | 0 / 0 | 0 / 0 |
| LANIK S.R.O. | Determination of photocatalytic activity | 0 / 0 | 45 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| LASCAM SYSTEMS S.R. O | Si wafer analysis by SEM/EDX | 0 / 0 | 0 / 0 | 0 / 0 | 4 / 0 | 33 / 1 |
| LASVIT S.R.O. | Testing and testing of various materials | 38 / 2 | 46 / 2 | 0 / 0 | 94 / 4 | 9 / 0 |
| LINET SPOL. S.R.O | Corrosion resistance assessment | 57 / 2 | 10 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| MEGA A.S. | Cyclic corrosion test of the coating | 0 / 0 | 0 / 0 | 0 / 0 | 12 / 0 | 0 / 0 |
| MERO CR, A.S. | Project "Reduction of corrosion attack on pipelines". | 529 / 21 | 431 / 17 | 497 / 20 | 200 / 8 | 29 / 1 |
| MESTO KRALUPY NAD VL. | Verification of chemical composition and corrosion resistance | 0 / 0 | 0 / 0 | 0 / 0 | 35 / 1 | 0 / 0 |
| METROSTAV A.S. | Cooperation in the resolution of complaints. | 45 / 2 | 0 / 0 | 0 / 0 | 2 / 0 | 88 / 4 |
| MEVA A.S. | Corrosion testing in salt spray. | 0 / 0 | 0 / 0 | 42 / 2 | 0 / 0 | 0 / 0 |
| MIGNEN CR S.R.O. | Determination of the amount of hydrogen in the aluminium matrix. | 0 / 0 | 0 / 0 | 10 / 0 | 0 / 0 | 0 / 0 |
| MIKROCHEM LKT SPOL. S.R.O. | Determination of elemental and phase composition of samples. | 4 / 0 | 46 / 2 | 0 / 0 | 31 / 1 | 0 / 0 |
| MND ENERGY STORAGE A.S. | Determination of critical parameters of metallic materials. | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 150 / 6 |
| MORKUS MORAVA S.R.O. | Testing of organic coatings | 0 / 0 | 0 / 0 | 0 / 0 | 50 / 2 | 0 / 0 |
| MZ-CHROM, S.R.O. | Accelerated corrosion test | 0 / 0 | 6 / 0 | 13 / 1 | 0 / 0 | 0 / 0 |

| | | | | | | |
|------------------------------------|---|---------|----------|----------|----------|----------|
| NARODNI GALERIE | Determination of the cause of damage to heating elements | 0 / 0 | 22 / 1 | 0 / 0 | 0 / 0 | 0 / 0 |
| NEMOCNICE NA HOMOLCE | Laboratory assessment of the effects of corrosion on post-buildings | 0 / 0 | 0 / 0 | 23 / 1 | 0 / 0 | 36 / 1 |
| NUCLEAR POWER ENGINE | Literature search | 0 / 0 | 40 / 2 | 12 / 0 | 0 / 0 | 0 / 0 |
| ORKLA FOODS | Testing the composition of corrosion-resistant materials | 0 / 0 | 0 / 0 | 15 / 1 | 0 / 0 | 13 / 1 |
| PARDAM NANO4FIBERS S.R.O. | Corrosion tests | 0 / 0 | 0 / 0 | 23 / 1 | 0 / 0 | 0 / 0 |
| PBS TURBO S.R.O. | Assessment of adhesive strenght | 0 / 0 | 143 / 6 | 0 / 0 | 0 / 0 | 0 / 0 |
| PLASTOIL EUROPE, A.S | Literature search | 0 / 0 | 45 / 2 | 0 / 0 | 0 / 0 | 0 / 0 |
| POCLAIN HYDRAULICS, | Corrosion tests | 106 / 4 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| PROMENS A.S. | Test of UV resistance of panels | 0 / 0 | 0 / 0 | 0 / 0 | 13 / 1 | 0 / 0 |
| PV DESIGN AND BUILD | Measurement of Zn layer thicknesses | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 84 / 3 |
| RANIDO, S.R.O. | Analytical services, project cooperation | 156 / 6 | 592 / 24 | 0 / 0 | 0 / 0 | 0 / 0 |
| REALSAN GROUP, SE | Development of a utility model design | 15 / 1 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| REFORK SE | Literary research | 0 / 0 | 0 / 0 | 20 / 1 | 0 / 0 | 0 / 0 |
| ROBERT BOSCH, SPOL. RBCB/FIN1 | Parts contamination analysis | 0 / 0 | 0 / 0 | 0 / 0 | 48 / 2 | 0 / 0 |
| RWE GAS STORAGE CZ, | Determination of the cause of steam pipe damage | 0 / 0 | 0 / 0 | 150 / 6 | 717 / 29 | 410 / 16 |
| SAINT-GOBAIN CONSTRU Divize Rigips | Analysis of the structure of gypsum samples | 192 / 8 | 51 / 2 | 33 / 1 | 6 / 0 | 0 / 0 |
| SENIOR FLEXONICS CZE | Cyclic corrosion test | 57 / 2 | 0 / 0 | 59 / 2 | 0 / 0 | 0 / 0 |
| SGS CZECH REPUBLIC, | Microbial contamination assessment | 10 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| SCHULKE CZ, S.R.O. | Determination of the corrosivity of the product | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 18 / 1 |
| SINGING ROCK S.R.O. | Certification of corrosion resistance of climbing carabiners | 0 / 0 | 0 / 0 | 38 / 2 | 0 / 0 | 0 / 0 |
| SKODA AUTO A.S. | Determination of H2 content in samples, technical support and research activities | 49 / 2 | 47 / 2 | 309 / 12 | 281 / 11 | 284 / 11 |
| SMART COATINGS S.R.O. | ISO test execution | 0 / 0 | 0 / 0 | 0 / 0 | 10 / 0 | 0 / 0 |

| | | | | | | |
|--|--|---------|----------|----------|---------|---------|
| SPOLEK PRO CHEMICKOU A HUTNÍ VÝROBU | Preparation of research | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 170 / 7 |
| STADYN PRAHA S.R.O. | Building engineering survey and measurements | 0 / 0 | 0 / 0 | 15 / 1 | 0 / 0 | 0 / 0 |
| SUNCATALYST LABORATOŘ | ISO tests | 100 / 4 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| SUSPRO S.R.O. | Corrosion tests | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 24 / 1 |
| SVUM A.S. | Materials testing, accelerated corrosion tests | 140 / 6 | 261 / 10 | 273 / 11 | 200 / 8 | 0 / 0 |
| SVUM-CZ, S.R.O. | Corrosion tests | 10 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| TECHNICKA UNIVERZITA Liberec | Chemical and microscopic analyses | 30 / 1 | 13 / 1 | 15 / 1 | 70 / 3 | 0 / 0 |
| TESORO SPIN OFF, S.R.O. | Cultivation of microorganisms | 0 / 0 | 0 / 0 | 50 / 2 | 50 / 2 | 0 / 0 |
| TOMTON S.R.O. | Innovation Voucher | 0 / 0 | 390 / 16 | 170 / 7 | 0 / 0 | 60 / 2 |
| TRADE FIDES, A.S. | UV resistance testing of products | 0 / 0 | 0 / 0 | 0 / 0 | 13 / 1 | 0 / 0 |
| TRANE TECHNOLOGIES S.R.O. | Determination of oil content in refrigerant | 26 / 1 | 13 / 1 | 135 / 5 | 33 / 1 | 0 / 0 |
| UMBAKA S.R.O. | Analysis of the quality of the Zn layer | 3 / 0 | 12 / 0 | 0 / 0 | 23 / 1 | 0 / 0 |
| UNICHTERM S.R.O. | Disinfectant study | 0 / 0 | 0 / 0 | 31 / 1 | 0 / 0 | 0 / 0 |
| UNIPETROL VYZKUMNE Centrum | Sample analysis, heat load capacity | 23 / 1 | 0 / 0 | 0 / 0 | 10 / 0 | 0 / 0 |
| UNIVERZ. J.E.PURKYNE | Corrosion exposure of experimental samples | 0 / 0 | 0 / 0 | 0 / 0 | 20 / 1 | 99 / 4 |
| VALEO AUTOKLIMATIZACE | Corrosion tests | 0 / 0 | 0 / 0 | 0 / 0 | 25 / 1 | 0 / 0 |
| VALEO VYMENIKY TEPLA | Corrosion tests | 0 / 0 | 0 / 0 | 0 / 0 | 232 / 9 | 194 / 8 |
| VITKOVICE CYLINDERS | Corrosion testing of cylinders | 144 / 6 | 144 / 6 | 0 / 0 | 0 / 0 | 0 / 0 |
| VLADIMIR NOVAK | Assessment of the facade coating | 10 / 0 | 0 / 0 | 3 / 0 | 0 / 0 | 0 / 0 |
| VU POTRAVINARSKY | Determination of photocatalytic efficiency | 42 / 2 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| VYZKUMNY A ZKUSEBNI ÚSTAV LETECKY A.S. | Accelerated corrosion tests | 5 / 0 | 60 / 2 | 0 / 0 | 0 / 0 | 17 / 1 |
| WOODCOMP PROPELLERS | Corrosion tests | 0 / 0 | 20 / 1 | 4 / 0 | 0 / 0 | 0 / 0 |
| YNNA, SPOL. S R.O. | Determination of the cause of bearing damage | 0 / 0 | 0 / 0 | 34 / 1 | 0 / 0 | 0 / 0 |
| Z O K - SYSTEM S.R.O | UV resistance test of plastic rails | 0 / 0 | 0 / 0 | 21 / 1 | 0 / 0 | 0 / 0 |
| ZAPADOČESKA UNIVERZITA PLZEŇ | Corrosion resistance of welds | 0 / 0 | 0 / 0 | 120 / 5 | 93 / 4 | 0 / 0 |
| ZEBRA GROUP S.R.O. | Accelerated cyclic test | 0 / 0 | 0 / 0 | 43 / 2 | 0 / 0 | 0 / 0 |
| ZU, OSTRAVA | Interlaboratory tests | 0 / 0 | 0 / 0 | 60 / 2 | 90 / 4 | 0 / 0 |

| | | | | | | |
|--|----------------|------------|------------|------------|----------------|------------|
| ZVVZ MACHINERY, A.S. | Exposure tests | 0 / 0 | 0 / 0 | 0 / 0 | 50 / 2 | 0 / 0 |
| Total (items < 10 000 CZK are included) | | 5080 / 203 | 4603 / 184 | 5918 / 237 | 10774 / 431 | 4036 / 161 |

Note: List and describe contract research activities with a revenue in a given calendar year, regardless of the amount of financial revenue.

3.4 Research results with existing or prospective impact on society

The evaluated unit shall briefly comment on a maximum of 10 (considered most significant by the evaluated unit) research results already applied or realistically heading towards application during the period of 2019–2023, based on the overview annex table 3.4.1 (it is recommended to indicate results with a link to projects listed in indicator 3.3). The evaluated unit must demonstrate in its description that the research results have led or will soon lead to positive impacts²⁶, on society (e.g. description of how the results are used by various users, the range of persons/institutions for which the result is relevant, measurable economic impacts, etc.). The evaluated entity shall indicate in its commentary whether the gender dimension is considered in these results and discuss the impacts of the results regarding sustainability.

Maximum range 300 words/result.

Self-assessment

The Technopark is not part of the educational infrastructure of the university, and UCT Prague does not receive any financial support for its operation. Therefore, Technopark staff must generate money to run the facility through grant or commercial projects. Part of the income also comes from rentals. This fact significantly limits the possibilities for independent research, both financially and in terms of time, with regard to the capacity of the research staff.

Research is therefore carried out in collaboration with industrial partners and the results are immediately applied in practice. The quality of the cooperation with the Technopark is also reflected in the fact that the projects are gradually building on each other and the cooperation continues in subsequent calls.

The most important outputs/projects are listed in Table 3.3.1.

All the results listed in Table 3.4.1 are used in practice. They have been developed on the basis of contract research or grant projects.

UIAA - Output is used by Technopark, Technopark regularly conducts relevant tests according to the accredited Methodology. Safety testing of materials used for climbing purposes is crucial for their safe use.

Corrosion monitoring - the developed sensors for corrosion monitoring in confined spaces are being manufactured, Gema provides the production of the control unit and the marketing of the product. Corrosion monitoring significantly reduces damage caused by overlooking corrosion of various materials, e.g. in storerooms. Direct economic benefits cannot be determined yet; the devices are used in a test mode. Further modification of the equipment for explosive environments and implementation of on-line data transmission is currently in progress.

Cooperation with Corezinc a.s. - the designed technology for the production of anti-corrosive paints based on waste zinc has already been implemented and further modification is in progress. The use

²⁶ See Terms definition.

of waste Zn has a significant economic and environmental benefit for the society, unfortunately the financial impact is not known to us, it is a trade secret of Corezinc, a.s.

RWE Gas Storage - uses the developed methodology to check the safety of its installations. The economic benefits cannot be quantified. The safety of gas networks is a fundamental requirement for the business of RWE Gas Storage

Table 3.4.1 - Overview of research results in the period under evaluation

| Type of result ^[1] | Year of application | Name |
|--|---------------------|--|
| Standard of the International Climbing and Mountaineering Federation, UIAA | 2020 | UIAA 123 Rock Anchors ; research led to an update of the standard introducing a procedure for testing and approval of permanent climbing anchors to provide 50-year lifetime in different climates |
| Accreditation by UIAA | 2021 | UIAA Accredited Laboratory ; Technopark Kralupy as the first test laboratory to deliver the corrosion resistance testing according to the UIAA 123 standard |
| Products | 2023 | 100% recycled zinc powders FZNP15 and ZNP38/16HS have been developed in collaboration with SME Corezinc a.s. as raw materials for primer paints for highly corrosive environments and commercialized |
| Methodology | 2023 | Classification of indoor corrosivity in locations polluted with organic acids |
| Pilot plant; product | 2022 | Development and start of pilot production of corrosion sensors and corrosion monitoring system CorrSen in collaboration with SME Gema a.s. |
| International standards | 2021 | Research and measurements of lead corrosion properties in indoor atmospheres led to an update of the international standards EN ISO 11844-2 and EN ISO 8407 |
| Prototype | 2021 | Electronic measurement device for corrosivity classification |
| Risk assessment system | 2022 | A point system for assessing the risk of hydrogen embrittlement in gas storage facilities based on application conditions and type of steel has been developed for RWE Gas Storage |

^[1] Specify the specific type of result. Add rows as needed.

Note 1: Please list and describe the results already applied in practice or heading towards application in practice with existing or prospective impact on the society (e.g. domestic or foreign patents, sold licenses, spin-offs, prototypes, varieties and breeds, methodologies, significant analyses, surveys, expert outputs for policymaking or other forms of non-publication outputs, etc.). Indirect results of research, development and creative activities with documented societal impact, e.g. expert activities, services to the public/government/scientific community, may also be reported.

TRANSFER OF RESULTS INTO PRACTICE

3.5 Transfer of results into practice

The evaluated unit shall briefly describe its system for transferring results into practice. It shall also indicate up to five of the most typical users of its results, whether in the university environment or in the non-university application/corporate sphere, detailing how it collaborates with them and how it seeks out new users (using a maximum of five specific examples).

It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.)²⁷, providing brief description of the commercialisation methods used. The effectiveness of the transfer of results and the commercialisation of R&D&I results will be described using a selection of results (max. five) listed in annex table (Table 3.4.1).²⁸

Additionally, the evaluated unit shall briefly comment on the funds received during the period of 2019–2023 from non-public, non-grant sources (e.g. licences sold, spin-off revenues, donations, etc.). A full summary shall be provided in annex table (Table 3.5.1).

Maximum 500 words plus 200 words for each provided example of finding a new user of results and commercialization.

Self-assessment:

The results of Technopark research are transferred to industry on the basis of contracts for the implementation/co-ownership of project results, in the case of projects with public support.

In the case of contract research, the results are implemented by the client and the Technopark holds the know-how. In most cases it is not further applicable, information on contract research is limited by confidentiality agreements. Typical collaborating users of Technopark's research results are the following:

- Voestalpine, GmbH - corrosion engineering
- Ranido, s.r.o. - research and development of heterogeneous catalysts
- Grena, a.s. - temperature resistant materials
- Sand Team, s.r.o. - materials for the foundry industry
- Holcim Research Centre (FRA) - recycling of building materials, decarbonisation

New partners are selected through information on the website or by personal contacts at specialized events.

The sale of licenses is not possible due to the project system of cooperation with the application sector. In 2019-2022, there have been several discussions about the possibility of establishing a spin-off company to deal with temperature resistant materials. However, this was not realized yet.

²⁷ In the case of military HEIs, their specific position is taken into account when evaluating the commercialisation/evaluation of R&D&I results.

²⁸ If the commercialisation of R&D&I results is carried out in this way.

Table 3.5.1 - Summary of non-public revenues received during the period under evaluation

| Type of revenue | Revenue (in thousands CZK/EUR) | | | | |
|-----------------|--------------------------------|------|------|------|------|
| | 2019 | 2020 | 2021 | 2022 | 2023 |
| | | | | | |
| | | | | | |
| | | | | | |
| Total | | | | | |

Note: Enter funds raised for R&D&I from non-public sources besides grants or contract research (e.g. licences sold, spin-off company revenues, donations, etc.) in the calendar year.

POPULARIZATION OF VAVAI

3.6 The most important activities in the field of popularization of R&D&I and communication with the public

The evaluated unit shall briefly describe its main activities related to the popularisation of R&D&I and communication with the public (e.g. popularisation lectures, citizen science initiatives, etc.) during the period of 2019–2023 and provide up to 10 examples that it considers the most significant.

Maximum 500 words plus 200 words for each example given.

Self-assessment:

With respect to the workload of Technopark staff, these activities are minimal. The work conducted with chemical substances is not optimal for public presentation. In addition, information on the experiments carried out is very often limited by the NDA.

Exceptions are excursions by high school students. In this case, the groups are small, and the excursion are focused on general popular topics such as photocatalysis, electron microscopy, use of the tomograph, etc.

The main communication channel with the public is the website:

www.technopark-kralupy.cz

www.cirktech.cz

IMPLEMENTATION OF RECOMMENDATIONS

3.7 Implementation of the recommendations in Module 3

The evaluated unit will briefly describe how it has implemented the recommendations for Module 3 from the previous evaluation period, if applicable.

Maximum 1000 words.

Self-assessment:

The evaluation of the Technopark in the Evaluation Report of the International Evaluation Panel indicates the following main problems:

- Lack of communication with individual faculties

In the 10 years of the Technopark's operation, it has not been successful in setting clear rules for faculty cooperation with the Technopark. This is due to different accounting procedures of individual departments. Also, the salary system at the faculties and Technopark is different and there is limited interest on the behalf of the faculties to cooperate with Technopark.

- Status of PhD students within the VŠCHT

This has been resolved within the Technopark and the current system of PhD student involvement in Technopark activities is attractive and functional for students.

- Declining support for grant projects in the Czech Republic

Technopark is trying to address this problem by expanding into the Ústí nad Labem region, the CirkTech project. Here, under the planned calls of the Operational Programme of Just Transition Fund, there will be significant research support until at least 2032. However, the number of potential applicants is decreasing.

- Development of the Mechanochemical Operations Centre at the Čížkovice cement plant - CirkTech

The preparation of the CirkTech project is currently underway, with planned support of CZK 350 million. A research infrastructure will be built to support technology transfer, mainly focused on the circular economy. It is envisaged to build a flexible workplace of a semi-operational design.

The implementation of the project will start at the beginning of 2026 and will be completed in 2028.

Summary:

- The aim of the project is to build a workplace operating a flexible demonstration unit for the study of decarbonization and transformation of industrial resources in real conditions, focused on the use of local sources of waste and other raw materials in the Ústí nad Labem Region for processing into marketable products, called CirkTech.

- Testing of decarbonization and transformation processes will be carried out on a real source - a cement rotary kiln

- Testing of materials within the framework of the circular economy will be tested on a rotary kiln, supplemented by mechanical sample preparation and subsequent hydrometallurgical processing

- The aim is to test new technological processes (including decarbonization) leading to the effective processing of industrial waste and other raw materials into marketable products on a pilot scale

- The CirkTech center will be located on the premises of the Holcim (Česko), a.s. cement plant. in Čížkovice, where the Institute of Chemical Technology has now built a pilot-scale rotary kiln and some other equipment (mills, coolers, etc.) with its own funds

- The purpose of the subsidy is the reconstruction of the existing building, installation of a decarbonization unit, addition of a rotary kiln with sample preparation and hydrometallurgy, logistics and support spaces
- The project benefits the Ústí nad Labem region, in particular by testing the decarbonization unit on a real rotary kiln, processing industrial waste from localities in the region, cooperation primarily in the field of analytical chemistry with the MATECH UJEP project and increasing the attractiveness of the region for young scientists
- The action plan is defined by the team for preparing the grant application, the individual necessary steps in

Stage 1 – until the application is submitted and

Stage 2 – Construction of CirkTech

- The implementation of the CirkTech project is expected from 5/2025 and will be fully operational in 2028

Description

The center will be located in the industrial complex of Holcim (Česko) a.s. in Čížkovice. The main part is a rotary kiln, which is a copy of a cement plant and serves as a source of real flue gases generated during cement production for studying the decarbonization process and for developing and verifying new technological processes for processing various materials (batteries, solar panels, fly ash, construction and industrial waste containing metals and plastics) into reusable products (metals and their compounds, as well as usable and marketable products

The influence of these processes on the decarbonization process will be monitored.

The decarbonization process will be implemented at a real emission source. The research will cover all stages of this process, i.e. cooling, cleaning from solid particles, CO₂ separation and the actual methanation process using H₂. Hydrogen will be produced by an electrolyzer powered by photovoltaic panels. The resulting methanol will be used to develop downstream technologies for the production of higher hydrocarbons.

The technologies will be developed with regard to their possible application in existing operations with minimal investment costs.

The results of these activities will be technological processes leading to the effective processing of local raw materials and waste into economically usable and marketable products. The outputs will include their assessment from the perspective of their utility, operational and economic parameters and data for the design of possibilities for their commercial use.

Planned research areas:

- a. Capture and conversion of CO₂ from a real industrial source on a quarter-scale
- b. Materials based on aluminosilicates and their industrial use
- c. Hydrometallurgical processes

Planned research activities until 2030

Ad a)

Comprehensive study of the conversion of CO₂ to CH₃OH from real gas, it is expected that other departments will be involved, especially CTU Prague and UJEP.

- Research on the influence of flue gas composition on conversion efficiency and process stability

Ad b)

- Recycling of building materials

- Mechanochemical processing of local resources (fly ash, clay) into materials with higher added value commercially applicable

- Monitoring the influence of TAP combustion on the quality of cement products

- Preparation of application quantity (~ 100 kg) of special materials for the MATECH (UJEP) synergistic project
- Ad c)
- Research work focused on the economic use of accompanying materials obtained during Li mining and processing, especially alkali metals (mainly Rb) and accompanying aluminosilicates (feldspars)
 - Operation of a continuous line for processing Li salts
 - Processing of metal-bearing waste
 - Research on alternative recycling technologies focused mainly on Li batteries and waste from renewable energy sources (wind turbine propellers, photovoltaic cells, etc.)

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 3

| Document name | No. criteria | Location (link in HTML) |
|------------------------------|--------------|---|
| Web page od Cirktech project | 3.7 | https://www.cirktech.cz/ |
| | | |
| | | |
| | | |

SELF-EVALUATION REPORT FOR MODULES 4 AND 5

HIGHER EDUCATION INSTITUTION NAME:

University of Chemistry and Technology Prague

COMPANY REGISTRATION NUMBER (CRN): CZ60461373

MODULE 4 – VIABILITY

ORGANISATION AND MANAGEMENT OF R&D&I

4.1 Organisation and management of R&D&I

The HEI will briefly describe its organisational structure¹ and describe the R&D&I management system including the role of the HEI's central management, the management of faculties, and the HEI's institutes in organizing and managing R&D&I. It should also describe the role and structure of the technical and economic apparatus.

Maximum 1000 words.

Self-assessment:

The definition of the powers, competencies and responsibilities of the governing body and other self-governing academic bodies at UCT Prague in R&D&I is fully in accordance with the national regulations. The central self-governing bodies of UCT Prague, i.e. the Academic Senate and the Rector, play a key role in the relations between university-wide bodies and the bodies of individual components of the university.

The university is headed by the **Rector**, to a certain extent represented by **the Vice-Rectors** and **the Bursar**, who directly report to the Rector for their activities. The UCT Prague management structure combines direct (line) and methodical (coordination) relations at the level of the university as a whole and at the level of its individual components.

The Academic Senate of the UCT Prague (hereinafter referred to as the Academic Senate) is the highest self-governing representative academic body. The Presidium consisting of the President and three Vice-Presidents is the body of the Academic Senate. There are 4 working committees acting within the Academic Senate: Educational, Science and Research, Economy and Organisational. The R&D&I activities are mainly dealt with by **the Science and Research Committee**.

Within UCT Prague there are four faculties pursuing activities within the area of R&D&I - **Faculty of Chemical Technology, Faculty of Environmental Protection Technology, Faculty of Food and Biochemical Technology, Faculty of Chemical Engineering**), which are divided into individual **departments** providing education and research, and the university institute - **Technopark Kralupy** primarily focused on cooperation with industry; all of them are supported by the Rectorate and special-purpose departments.

The Scientific Board of UCT Prague (hereinafter referred to as the Scientific Board) is a self-governing body of the university with the highest specialised and pedagogical qualification, which has conceptual, initiative and evaluation competences in the area of R&D&I. The Scientific Board is chaired by the Rector.

¹ A graphical representation of the organisational structure will be provided as an annex.

The Internal Evaluation Board of UCT Prague (hereinafter referred to as the Internal Evaluation Board) is a self-governing body that manages and ensures the course of internal quality evaluation of educational, creative and related activities of UCT Prague, including approval of key documents related to quality assurance and evaluation. The Board is chaired by the Rector. The Vice-Chairperson of the Internal Evaluation Board coordinates the processes of evaluation and quality assurance of educational, creative and other activities at UCT Prague.

The Rector's Board (Rector's College) is an advisory body of the Rector whose competence is defined by the Organisational Rules. It is the top body in which the Rector discusses current issues concerning the functioning, management and future plans of the university. The Rector's Board consists of Vice-Rectors, Bursar, Deans of Faculties, Chairperson of the Academic Senate, representative of the student members of the Academic Senate, Director of the Administration of University Facilities and Director of the Technopark Kralupy.

The University's Board of Trustees (hereinafter referred to as the Board of Trustees) is a body of the university that ensures the fulfilment of the mission of the organisation and its management. Members of the Board of Trustees are appointed by the Minister.

The Organisational Rules play an important role in defining the competencies, powers and contents of activities of senior employees of the individual components of UCT Prague, i.e. the faculties and Technopark Kralupy Institute. The Organisational Rules define the basic forms and schemes of management, delegate powers in representing and resolving competency disputes valid also for individual components of the university. A detailed organisational schema of individual faculties and rectorate units forms part of the Organisational Rules.

The R&D&I activities at UCT Prague are pursued by several categories of employees. The highest share belongs to the categories of associate professor, assistant lecturer, scientific, research and development worker. PhD students are also substantially involved in R&D&I activities. The numbers of staff and students pursuing activities in the area of R&D&I fluctuated naturally between 2019 and 2024; this has no significant impact on the performance of the university in the area of R&D&I.

R&D&I QUALITY MANAGEMENT AND SUPPORT SYSTEM

4.2 System of support for a quality R&D&I environment and incentive measures for quality science

The HEI will briefly describe the systemic incentive measures/tools to support quality R&D&I (if applicable). For each measure/tool described, an example will be provided to illustrate the effectiveness of the measure/tool in practice (e.g. number of projects supported by internal grants, statistics on the use of advisory systems, number of newly established research teams, etc.). The description will pay particular attention to:

- A system of support for attracting national and international projects of projects.
- A system for project consultancy/management/administrative support.
- Science management (e.g., personnel and financial capacity for R&D&I transfer, personnel and financial capacity of the project acquisition support system, science managers, data analysts, business and innovation advisors, etc.).
- The existence of internal funding schemes.
- Strategy/opportunities for establishing new research teams (including international ones) and supporting them within the HEI (e.g. sharing of R&D&I equipment, laboratory and information facilities, administrative support, etc.).
- Support system for students and early career researchers².
- a system to support excellent science (e.g. support for excellent scientists, research teams, PhD students, collaborations, infrastructure, etc.).
- A system of support for interdisciplinary research and collaboration within the HEIs.
- The concept of providing conditions for the emergence of new, high quality research directions/topics, especially those with application potential.

Maximum 300 words per point.

Self-assessment:

UCT Prague is open to host ERC and other prestigious transferable projects. There is a possibility of hosting these projects in several laboratories devoted to excellent research. The capacity of them is limited, but the university is searching for expanding those possibilities in the case of increased needs (reconstruction of selected parts of our buildings, transfer of lecture rooms to the new building, which will be built in years 2026 – 2030, spaces in Technopark Kralupy). There is also a specific project call financed by Dagmar Prochazkova Fund, operated by the university, which was established in order to attract potential excellent young researchers as newcomers or the ones returning from a postdoc stay abroad. During the project solution, they are obliged to apply for ERC or national excellent type of a project (JUNIOR STAR or EXPRO funded by Czech Science Foundation).

UCT Prague established a Project Centre in 2021 in order to centralize and unify the project support. This office offers the support for finding suitable calls, writing the project applications, administration of the projects (by default for central infrastructural projects, for the others upon agreement), communication with the funding agencies and other tasks related with projects. In its operation, Project Centre cooperates with the Personnel Department and Finance Department. The Project Centre organizes workshops with project evaluators regarding the particular calls and other seminars, like regular workshops for the administrators of the projects from operational programs at the faculties.

Science management at the university is ensured by the standard hierarchy, employing heads of the respective departments, vice-deans and vice rector for research and development. However, the scientific and research activities basically respect the bottom-up strategy. We fully respect academic freedom in research, which means that every researcher can define their own research topics. At

² Student grants, support for PhD students, postdocs and early career scientists.

the early beginning, these topics can be solved with the support of the long-term conceptual development of the research organization (LCDRO) funds, in the case of the agreement of the Head of the respective department. The head should ensure that the issue being addressed falls within the scope of the department. After the feasibility is proved, the scientists are applying for a suitable grant project. In the case of larger multidisciplinary projects, such as the ones funded by operational programs, the problematics defined by the bottom-up approach serve as a base for their definition, while the topics to be solved are decided by the vice-deans and vice-rector for research and development. The supporting units are the Research and Technology Transfer Office and Project Centre, which are ensuring the support in research coordination, reporting to the respective ministries and setting the policy and providing the support for technology transfer.

Internal funding schemes contain the internal grant agency and the above-mentioned Dagmar Prochazkova fund. The internal grant agency is announcing the following calls annually: internal research grants, internal pedagogical grants, grants for social activities and junior grant projects. The internal research grants are focused on the research projects of PhD students with possible participation of master students. The grants are evaluated at the faculties by the faculty grant committees. The pedagogical grants are devoted to improvements in teaching, such as new study materials or innovation of the subjects. The call for social activities of the students supports sport and cultural activities. The call for junior grants offered a small funding amount as a starting grant for young researchers. Because the available amount was not high enough for starting an independent research career, it was decided to change this scheme to support the application for the projects. When the early career researcher applies for his/her first grant, he/she gets a financial reward. The rules for all internal grant calls are announced here: <https://www.vscht.cz/research/internal-grant-agency>

The establishment of the new research teams is supported naturally by the Heads of the departments, as it brings new scope for the research and enriches the scientific activities of the department. The new research teams can be supported by long-term conceptual development of the research organization (LCDRO) funds ensured by Ministry of Youth and Sports (MEYS), particular projects funded by the national or international agencies and the above-mentioned Dagmar Prochazkova fund. The leaders of prospective groups can also apply for external funding, such as Experientia foundation. The equipment used for research can be shared inside the department, between the departments of the faculty or between the faculties, forming ad-hoc research capacities and teams. Moreover, the Central laboratories play a significant role in supporting not only the newly established teams, but also the traditional ones. Central laboratories serve as the core facility for analytical service in many disciplines, such as X-ray diffraction analysis, various chemical analyses including the mass spectroscopy, IR and Raman spectroscopy, XPS, NMR and others, and thermal analysis. Administrative support is ensured by the department, Project Centre in the case of research grants and central rectoral offices.

The financial support system for students contains scholarships according to the law and internal university regulations and the above-described internal grant schemes. Early career researchers can use the above-mentioned support by Dagmar Prochazkova fund, junior internal grants (currently being modified) and other tools outside the university (JUNIOR STAR funded by Czech Science Foundation, ERC projects etc.). A large series of early career researchers came to the university with the support of Marie Curie Sklodowska Action (MSCA) mobility grants and their local alternative funded by MEYS. The Project Centre helps with searching for these possibilities and preparation of the proposals and administration of the projects.

Excellent science is supported by the possibility of the use of a limited number of the above-mentioned "excellent laboratories". The university is continuously searching for possibilities how to extend this capacity. One of the ways is currently the preparation of a Horizon Teaming application. Construction of a new building close to the Dejvicka metro station will also lead to the extension of

this capacity, because the majority of the lecture rooms and some administrative offices will be moved there, and the empty space will be partially used for this purpose. For early career investigators and excellent students, recognition and awarding are also of a high importance in their motivation. Therefore, the rector awards the excellent researchers by Rector's Prize annually. Moreover, excellent researchers are nominated to the available competitions, such as the Siemens Award, Hlavka's Award, MEYS Awards and others.

Nowadays, the majority of high-quality research is multidisciplinary and international. The cooperation between the departments and faculties is offered already to PhD students in the frame of internal grants, where the inter-faculty projects are allowed. Moreover, the majority of ongoing research projects funded by external agencies are of a multidisciplinary character and students can meet these topics already during the work on their bachelor theses. The typical examples are the cooperation between Faculty of Chemical Technology and Faculty of Food and Biochemical Technology on the development of biomaterials and testing of their interaction with cells or the cooperation between Faculty of Chemical Technology, Faculty of Chemical Engineering and Faculty of Environmental Technology on development of membranes, their modelling and characterization and their use e.g. in water purification. Interdisciplinary and internationalization is also supported by the university's fund for invitation of the specialists from abroad to have invited lectures and seminary talks.

The emergence of new hot topics of research usually starts with a unique idea of the local researcher or by a newcomer with fresh ideas. From the beginning, the feasibility of the idea is usually proved with the support of the department. Then the researcher presents this feasibility study as a part of the grant application. Starting in year 2024, the university is holding the grant TACR SIGMA "proof-of-concept", where the ideas with application potential are searched internally and the researchers can ask for funding needed for the verification to be ready for commercialization. The Research and Technology Transfer Office offers active support in commercialization.

4.3 Quality control system for R&D&I environment

The HEI will briefly describe the system of internal and external evaluation of research units, including the following aspects:

- Internal and external evaluation of R&D&I quality: This includes the evaluation of R&D&I by the HEI's authorities, the evaluation of research teams (if such a system exists), and the involvement of international scientific councils or other independent advisory bodies in quality control and of R&D&I management.
- The ethical aspects of research: This includes adherence to ethical principles and good scientific practice, compliance with related legislation (codes of ethics, ombudspersons, ethics committees and ethics hotlines, and systems for reporting whistleblowing and ethical misconduct).

The HEI shall demonstrate the functioning of the quality control systems in the R&D&I environment by examples (e.g., brief information on the evaluations carried out and their results, specific examples of the use of whistleblowing or the handling of ethical violations, etc.).

Maximum 500 words plus 200 words for each example described (max. five).

Self-assessment:

- **Internal and external evaluation of R&D&I quality**

The **external evaluation** comprises the official evaluation procedure by the MEYS. It contains the evaluation in five modules, where M1 (excellence) and M2 (bibliography) are evaluated annually, while modules M3 – M5 undergo the external evaluation each five years (this IEP evaluation). This evaluation process is compulsory for all universities in Czech Republic and brings a significant reflection to the processes of the university and quality in all main areas. Outputs from the evaluation of M1 and M2 modules are used by the faculties in targeting the LCDRO support between the departments. As the additional external evaluation, university applied for evaluation by IEP-EUA independent evaluation body, which will be completed this year. Moreover, university uses its International Advisory Board (IAB), composed mainly of former IEP members, which evaluated the university in 2020, is regularly used for consulting the research strategy and defining the strategic documents

Internal quality assessment and management is carried out centrally at the Rectorate level and implemented by the Department of Quality Assessment. This department collects data and information necessary for the strategic management of VŠCHT Praha and at the same time provides support for the management of the university units, especially the faculties. The activities of the department are based on the internal regulation Rules of Quality Assurance of Activities and Internal Quality Assessment of Activities. Based on the experience of the previous years, this document will be updated at the beginning of 2025. Within the framework of internal quality assessment, the UCT Prague evaluates for its individual activities the established Indicators for Quality Assessment at UCT Prague (internal standard No. A/N/961/2/2020). The sets of quality assessment indicators for individual areas of the activities of the UCT Prague are currently under review. Revised indicators for educational activities and creative activities have been prepared. The revision of indicators for related activities is still in progress.

- **The ethical aspects of research**

UCT Prague takes great care of the ethical aspects of research and adherence to ethical principles and good scientific practice. In 2024, a new version of the Code of Ethics was adopted, which reflects in more detail general ethical principles, principles in educational activities, principles in scientific research and other activities, principles in expert economic and support activities, conflicts of interest and handling of complaints based on violations of the Code of Ethics. In 2023, a social safety central point (ombudsman) was appointed and an anonymous online tool SafeTalk for reporting breaches of ethical rules was set up. The system is set up in two stages. The ombudsman seeks informal resolution. Only if the ethical violation cannot be resolved informally within the University, the complaint is dealt with in the Ethics Committee of UCT Prague. In the case of students, it is then referred to the disciplinary committees of the individual faculties. Within the framework of social security, the ombudsman regularly organises training seminars and workshops that lead to discussions about ethical problems at the university and how to solve them. Staff and students are regularly informed about these educational activities and through other channels - the university magazine, social networks - they are informed about the possibility of solving problems with the ombudsman or the ethics committee. The Ombudsman, together with the HR department, prepares e-learning courses on ethics and social safety. Student representatives are always appointed among the members of the Disciplinary and Ethics Committees.

The system for whistleblowing and the University's legislation was adopted in April 2022. Information on ethics and whistleblowing along with links and procedure for reporting complaints are provided on the University's prominent website. It is essential that all staff have been informed of the whistleblowing scheme. The internal documents that relate to this issue are the UCT Prague Code of Ethics, the Disciplinary Code for UCT Prague students, the Social

Security Directive at UCT Prague and the Directive on Reporting Breaches of EU Law through Internal Channels.

Specific examples:

- A PhD student approaches the ombudsman, claiming that he does not have time to work on his dissertation because he spends too much time working in the lab on a grant and accepting assignments from colleagues who are not in a supervisory relationship. The student meets with the ombudsperson, creates a map of supervisor-subordinate relationships, and they agree on a process whereby they present a timeline to the supervisor and the department chair that ties into the work on the project and the actual doctoral dissertation. This proposal is discussed and agreed by both parties.
- Over the course of a year, the Ombudsman has recorded several notifications via the anonymous SafeTalk chat room. The reports concerned bullying, inappropriate behaviour towards colleagues and students, abuse of a supervisory position towards students and substandard communication by an academic member of staff. Based on this information, the Ombudsperson notified Human Resources, the Department Head and the Dean of the Faculty. In a joint meeting and with the employee in question, all suggestions were discussed with respect to the employee's academic responsibilities. The Dean has taken action to ensure that no further complaints will be made.

4.4 Sustainability and resilience of R&D&I

The HEI will describe the arrangements for sustainability and increasing the resilience of R&D&I, if such a system exists, and provide examples of its implementation. These include:

- The sustainable development concept (strategy, objectives, plan and implementation).
- Social responsibility strategy.
- A knowledge transfer system, if it is established at central level.³
- The third role, the transfer of R&D&I results to society and interaction with local actors.
- The concept of research data management (data collection, access and sharing of data, use of the information obtained for R&D&I management, responsibility for data files, archiving and backup of data).
- Ethics and personal data protection.
- Intellectual property protection.
- Ensuring institutional resilience (resistance to foreign influence, cyber security, risk prevention, prevention of misuse of R&D&I and knowledge transfer results, a system to prevent or mitigate the negative impacts of R&D&I and knowledge transfer in society).
- Digitisation and the use of smart technologies.
- The institutional strategy for Open Science 2.0/Open Access (if one exists), including information on the operation of the institutional repository or similar tools.
- A system for training undergraduate and postgraduate students as well as staff in the field of intellectual property protection and technology transfer.

The HEI will demonstrate the effectiveness of its procedures by examples (e.g., the number of people trained in intellectual property protection and technology transfer, data on the usage of Open Access repositories, handling of risk incidents, etc.).

Maximum 300 words per point.

³ If the knowledge transfer system is decentralised to the unit level, the HEI shall describe how the system works.

Self-assessment:

- **The sustainable development concept**

An Institutional Sustainability Strategy has been prepared to support sustainability and has been approved by the relevant college authorities. The implementation of some of the measures initiated in previous years will continue to build on the current status. In the implementation of the Sustainability Strategy, UCT Prague will continue to benefit from shared knowledge, experience and good practice in achieving the Sustainable Development Goals (SDGs). The individual sustainability activities in the Action Plans are conceived in a comprehensive manner and are aimed at streamlining the entire process of the university's functioning; in addition to the traditional preservation of a healthy environment and economy, they address broader aspects in terms of social functioning, education, science, research and creative activities. In the area of R&D, the main focus is on promoting green skills and sustainability.

The links between research focuses, results and projects submitted and implemented, and the SDGs will be systematically monitored and analysed. A methodology will be developed to develop the creative competences and creativity of scientists and researchers at all career levels, with an emphasis on the applicability of research results in the context of green transformation and the SDGs. Topics related to sustainable development require collaboration across different disciplines on both basic and applied research projects at national and international level. The aim is to strengthen interdisciplinary and international cooperation, and to develop the competences and creative potential of scientists and researchers.

An intensive intersectoral dialogue focused on the issue of introducing sustainability principles into industrial and corporate practice will enable faster adaptation to new challenges and technological changes, support the development of applied innovations and accelerate the process of technology transfer.

For the management of R&D support, the systematic monitoring of research activities in the context of the SDGs has the potential to contribute to the identification of promising directions that would build on the possibility of strengthening interdisciplinary cooperation across the UCT Prague or stimulate the development of cooperation with partners at the national and international level. It will be important to monitor trends and requirements in the areas of circular economy, decarbonisation and resource efficiency and to identify opportunities for collaboration in the development of new materials, chemical specialties, analytics and bio/technologies that will support long-term sustainability.

As a quality research university, the mission of UCT Prague is to promote its own creative results that contribute to the SDGs in a clear and understandable way for the general public.

- **Social responsibility strategy and the Third role of UCT Prague**

UCT Prague is actively committed to social responsibility through education, research and involvement in public affairs. This commitment is enshrined in the University's Strategic Plan and institutional policies. UCT Prague considers the optimal ratio between these activities to be: education 45 %, R&D 45 % and service to society 10 %.

An integral part of the mission of UCT Prague is the active promotion and popularization of technical and natural science disciplines (Hour of Modern Chemistry, Festival of Science, Chemistry Olympiad) including their latest trends in the public with a direct impact on the sustainable development of society, the future of the young generation and the dissemination of civilizational and ethical values, especially democracy, openness, tolerance, respect, personal responsibility as well as education and culture in our society. UCT Prague promotes the

availability of quality education, especially in the field of natural and technical sciences, while offering lifelong learning courses and professional training for workers in industry.

UCT Prague emphasizes research aimed at addressing global challenges such as environmental sustainability, energy efficiency and circular economy. The University adheres to the ethical principles of research as set out in its Code of Ethics and the European Charter for Researcher.

The University implements measures for sustainable operations, including energy-efficient infrastructure, waste minimisation and the use of green chemistry principles in teaching and research. UCT Prague promotes responsible resource management and the reduction of its carbon footprint.

The University cooperates closely with state institutions and local government, both within the Dejvice Campus (joint memorandum of cooperation) and in the form of research collaborations. The University also takes care of cooperation with the corporate sector, either in the form of joint application research projects or in the form of long-term closer cooperation (VTP Kralupy, Cikrttech, University Centre in Litvínov, Prague innovation institute or Central Bohemian Innovation Center). The University also supports the local community by organising various cultural and social activities, science festivals, or by providing financial or volunteer assistance in times of crisis (floods, covid, war in Ukraine, tornado in Moravia).

The external activities of the university can be divided into several areas:

- Partnerships offering comprehensive solutions to scientific research problems using the university's expertise in industrial practice, according to the current needs of the national economy and society as a whole.
- Implementation of further education in various technical fields in the form of ČŽV, U3V - current social topics, turnkey education, reskilling/upskilling
- Focus on awareness and education of the general public - participation and organization of various local regional or national events dedicated to popularization and promotion of science, results of own scientific research and development trends, especially in technical fields. Participation in professional programmes of all types of media.
- Dissemination of education, ethical values, culture of social relations, tolerance between people.

UCT's commitment to social responsibility is firmly anchored in its management and strategic development, ensuring a lasting and positive impact on society.

- **Intellectual property protection**

The protection of intellectual property at UCT Prague is strictly governed by the legislation in force in the field of industrial property and copyright in the Czech Republic and the UCT Prague Directive on the Protection and Enforcement of Intellectual Property Rights [A/S/961/13/2018](#). This directive defines the rights and obligations of the authors of the results, the procedure for reporting the creation of the result and the future disposal of the results, including the distribution of income from the commercialisation of intellectual property to the authors.

Copyright protection is managed by the Centre for Information Services, which provides comprehensive support from manuscript to book, publishing of print and electronic publications, graphic services, and provision of student theses.

Industrial Property is the agenda of the Research and Technology Transfer Office, which ensures that sufficient information and support is provided in the area of patent and other protection. Together with authors, RTTO designs IP protection strategies, administers the filing of patent applications and other IP subjects, and communicates with patent attorneys.

The goal for the future is to raise awareness of the importance of IP protection for staff and PhD and MSc students and to proactively address potential IP protection in public support projects more intensively. The revision of the IP Directive is already in process and is expected to be completed during 2025.

- **A knowledge transfer system**

Knowledge and Technology transfer (TT) at UCT Prague is provided by the Research and Technology Transfer Office (RTTO), which is established by the Organizational Regulations. It is managed by a head who is responsible for its activities to the Vice-Rector for R&D.

RTTO ensures the protection of IP, analysis, development and exploitation of the commercial potential of results owned by UCT. At the same time, it ensures commercial and partnership communication of the UCT with industry. RTTO also creates/prepares documents for contractual provision of research cooperation with the application sphere, including setting up contractual terms and conditions, such as agreements on the use of results at the end of project solutions, and prepares documents for negotiating specific contractual terms and conditions with IP users, including mediation of the necessary legal service. In the case of grant projects, the RTTO always checks and ensures that there is no illegal public support in the use of the results. The TT managers cooperate with the Vice-Deans for R&D and the Vice-Deans for Cooperation with Industry at the individual faculties of the UCT, but the aim is to deepen the cooperation with the faculties, e.g. by involving research group leaders or technology scouts from among R1 and R2 researchers. In the future, it is important to deepen and intensify communication with faculties and individual scientific institutes/faculty groups, which should lead to an increase in the number of results suitable for commercialisation and their early capture.

In order to support technologies with application potential developed at the UCT, for which it is necessary to increase their TRL and thus the chance of their application, RTTO launched the internal grant call Proof-of-Concept in 2024.

In the case of specific R&D results, RTTO cooperates with external capacities, e.g. with I&I Prague for the LifeScience/BioTech area.

Last but not least, a high importance is placed on setting up the process of establishing spin-off companies of UCT Prague. This includes the preparation of internal guidelines or obtaining public support projects from national and European providers for the establishment of a business incubator. A key aspect of an establishment of spin-off companies involves collaborating with incubation programs in the Czech Republic and the EU, as well as engaging with investors. RTTO cooperates with the School of Business of the UCT in the area of business mentoring, business plan development, goals and strategies, marketing and presentation skills.

- **The Concept of research data management within the institutional strategy for Open Science 2.0**

UCT Prague fully supports the principles of Open Science, effective dissemination of scientific knowledge, and the principle that the results of publicly funded research should be freely accessible, i.e. Open Access principles are respected in the case of publishing and Open Data principles in the case of research data.

Research Data Management (RDM) practices at UCT are centralized through a dedicated web page open.vscht.cz, providing streamlined access to resources and additional support with OS practices in grant applications, licensing, data protection and metadata curation. The university utilizes Zenodo and the UCT Zenodo Community for publishing research data and archiving papers. These platforms enable curators to thoroughly review metadata, including licensing, content, author names, connected persistent identifiers (preferably DOIs) and ORCID IDs,

ensuring high RDM standards. In addition to Zenodo, UCT Prague also aims to utilize national data repository (NRP) and research-field-specific repositories planned by EOSC-CZ.

Obligations of researchers with regard to RDM are set out in the UCT Prague code of ethics. When relevant, the collection and storing of research data are subject to approval of ethics committee.

UCT Prague is a member of the CESNET e-infrastructure and as such, researchers are, amongst others, empowered to securely store and/or back-up their data, and utilize on-demand access to computational hardware and/or software tools. In addition to this, a secure on-campus storage capacity is currently being upgraded.

Researchers are directly supported by a dedicated Data Stewardship team, offering guidance on data management strategies, fulfilling the FAIR principles and creating robust data management plans in institutional Data Stewardship Wizard. Additional support includes an annual Data Stewardship course, and a range of events designed to promote discussion and RDM skill-building.

- **The Open Access Publishing Concept within the Institutional Strategy for Open Science 2.0**

UCT Praha supports the Open Access (OA) publishing policy, which is most often used by authors as a combination of:

- hybrid OA publishing in traditional journals from established publishers: by making the most of participation in the CzechELib consortium under the so-called transformative agreements with the key publishers for chemistry-related fields (Wiley, Springer Nature, ACS, RSC, OUP, CUP, IOP, AIP, ...) where UCT authors virtually unlimited OA publishing available, without extra costs.
- pure OA journals (Pure Gold OA): to support pure Gold OA journal publications (not covered by transformative agreements) a university OA fund is offered to co-fund such publications.

Such a setup offers a reasonable way to keep total costs under control and maximize OA uptake at the same time. All researchers can get personalized advice and on-site support.

- **GDPR Protection**

The protection of personal data at the UCT Prague is an important agenda, which is governed by applicable laws and regulations. Personal data protection, collection and processing is regulated as follows:

- Legislative framework: Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) and Act No. 110/2019 Coll. on the processing of personal data, as amended. These norms set out how personal data should be handled and what individual rights he or she has.
- Processing of personal data: UCT Prague processes personal data of students, employees, participants of lifelong learning courses and other subjects within the scope of its activities. This data is collected for specific purposes such as record keeping and data management related to the provision of tertiary education, employment of persons, administration of study programmes, course delivery, implementation of project activities and other related activities. The processing of data is mainly based on the fulfilment of legal obligations, the fulfilment of a contractual obligation, as well as a legitimate interest or the consent of the subject.

- **Authorisation and access:** Only authorised persons have access to personal data. This includes school staff who are instructed in data protection and are subject to strict information security rules in the processing, including a confidentiality agreement, a prohibition on disclosure of data or sharing of IT equipment and a prohibition on password or computer access.
- **Rights of data subjects:** Data subjects have the right to rectify inaccurate or incomplete personal data, access to their personal data, restriction of processing of personal data, portability of personal data. UCT Prague has a procedure for dealing with data subject requests in this matter, which is publicly available.
- **Security measures:** UCT Prague implements physical, technical and organizational measures to protect personal data against unauthorized access, loss or damage. This includes encryption, server security and employee notification.

- **Ensuring institutional resilience**

Strengthening institutional resilience to illegitimate influence is currently one of the main topics of the UCT, not only in response to the changing geopolitical situation. The UCT is fully aware of the importance as well as the complexity of the individual steps leading to the creation of an all-round robust system. For this reason too, a new working group has been established at UCT, within whose agenda (cyber security; illegitimate behaviour; prevention of misuse of R&D&I results and security in research) institutional resilience will be approached in a systematic and coordinated manner. The overall objective of the group will be to be able to respond to emerging situations in a flexible and far more effective way than has been the case to date.

In the area of Cybersecurity, UCT falls under Act No. 181/2014 Coll. and Implementing Decree No. 82/2018 Coll. since 2021, when a total of three Significant Information Systems were successfully identified and reported. On the basis of the resulting obligations, the UCT subsequently appointed a Cyber Security Manager, as well as created a plan for the gradual improvement of data protection and the fulfilment of legislative obligations. As part of this, regular staff training is carried out using the Cybersecurity Course, which is available to students and staff on the university's Moodle system, or by physical training sessions carried out in cooperation with the Information Security Service and various mock phishing campaigns carried out by the staff of the Computer Centre of the UCT in cooperation with external companies. Since 2012, the network has been segmented and the access of individual users to university resources has been controlled according to their rights and their assignment to the relevant organisational units. Since the same year, security monitoring of events in the network infrastructure has been carried out, both in the preventive and executive areas.

In the area of legislation, the UCT has an internal standard A/N/961/10/2024 8 - Code of Ethics of the UCT Prague, which sets out the basic rules and obligations of individual employees and students in the field of education and research. Employees also have various rules and guidelines on the university intranet.

- **Digitisation and the use of smart technologies**

In the field of digitalization, the UCT Prague has made significant progress in several areas in recent years:

- **Human Resources:** The implementation of electronic processing of documents (proposals for work contracts, remuneration, various types of certificates) has significantly facilitated the work of all employees, including academics and researchers. A new application for time reporting on projects is currently being launched.

- **Economics:** Electronic processing of invoices has been implemented, and plans are underway to launch electronic processing of the inclusion and removal of assets from the university's records (already in test now).
- **Education:** Recently, student identity verification (e-citizen) has been digitized, linked to the National Identity Authority (NIA), and bank identity verification is currently being implemented. In addition, upgraded and digitized modules for the accreditation process, state final exams, recruitment procedure and mobility process (student departures and arrivals) have been implemented. At the same time, the connection with the financial system was optimised to link study and economic data.
- **Strategy and management:** Currently, a data storage system has been implemented, to which the basic information systems recording the University's operational data are gradually being connected. The use of the data storage and reporting using Business Intelligence will significantly reduce the administrative reporting burden on the institution. The PVAP system for recording staff activities has been launched, which aggregates both the data contained in the information systems on the academic and scientific achievements of individual staff members. Thus, additional information can be uploaded regarding professional knowledge and education, membership in various professional groups, awards, etc.). Currently, a customized application for questionnaire surveys is being implemented, which will primarily be used as a source of data for quality assessment of study programmes.
- **R&D:** In the past years, a renewal of the Internal Grant Agency (IGA) system has been carried out and a renewal of the Grants and Projects Management (GAP) system is currently in progress. The main goal of both of these actions is both the upgrade to a modern Application Framework and their complete digitalization (electronic processing and approval of all documents). In addition, the System for reporting scientific results and publications is gradually being upgraded and developed. The last major innovation involved linking to ORCID and enabling individual staff to use it. Preparations are currently in progress to link to the national repository of scientific results.

- **A system for training undergraduate and postgraduate students as well as staff in the field of intellectual property protection and technology transfer**

For students and researchers, the Research and Technology Transfer Office organises regular voluntary seminars on intellectual property protection and technology transfer. Lectures and seminars are held by employees of the Office, external specialists or specialists from the Czech Patent Office.

The field of intellectual property protection and TT is usually an important part of projects such as Coordination and support actions focusing on researchers and students. In the period under review, mention can be made of the IGRA project (Internal Grants Reinforcing Activities for Doctoral Study Programmes) within the framework of the call of the OP VVV with the registration number CZ.02.2.69/0.0/0.0/19_073/0016928. During this project, one of the three key activities was the reinforcement and development of transferable competences and skills of doctoral candidates and within this activity the modules on IP protection, technology transfer and copyright were prepared. In feedback through a questionnaire survey, the modules were very positively evaluated.

In collaboration with the School of Business at UCT Prague, a semester-long Technology Transfer course has been designed for both undergraduate and postgraduate students. As an optional course, it is essential to highlight its significance and practical benefits to enhance student engagement.

From September 2025, IP protection will be part of the obligatory introduction seminar for new PhD candidates. This onboarding is designed as a full-day seminar to introduce new PhD candidates to the most important aspects of research and study, with IPR as an integral part of this seminar.

Examples

Training in the protection of intellectual property

- For example, in 2022, 81 postgraduate students and researchers were trained in intellectual property protection.
- 83 postgraduate students and researchers were trained in copyright and 28 in the Technology Transfer.

Data on the usage of Open Access repositories

- Between 2020 and 2024, the total of 25 Zenodo deposits generated 4126 views and 1862 downloads, demonstrating the community's interest in UCT's datasets.

PERSONNEL POLICY

4.5 Structure of human resources

The HEI shall describe the current state, age structure, degree of internationalization and development trends of the staff involved in R&D&I, along with their distribution by a job title and gender for the period of 2020–2024 as detailed in annex tables (Tables 4.5.1 to 4.5.3) (including the provision of technical and economic facilities).

Maximum 1000 words.

Self-assessment:

A long-term trend of increasing the number of employees can be observed at UCT Prague, which is confirmed by a comparison of the number of employees between 2024 and 2020, when the total number of employees increased by more than 130 employees, i.e. by 12%. Increases can be observed in all categories. The highest increase is recorded in the assistant category, which amounts to more than 27%, and the number of employees in the professor position is also higher, by more than 15% (+10.4 FTE).

It is certainly worth mentioning the staff listed in the position of “Early Career Research”, with a resulting year-on-year increase of 38%, is a significant increase and a possible promise of a positive development of academic and scientific research capacity in the future. The result is also supported by the figure in the women's category, where the difference is +12%. The increasing number of staff corresponds to the increasing amount of R&D funding received.

Overall, the proportion of women in other positions, with the exception of associate professor, has a decreasing tendency, which is not a positive result in terms of the strategic goals of UCT Prague in the field of gender equality and in the future period maximum attention should be paid to this group of employees. However, a certain hope for the future is given by the tendency to increase the number of women in “Early Career Research” category, where the number of women increased by 11%.

Conversely, there has been an increase in the number of foreign employees in all academic and R&D positions. Particularly pleasing is the increase in foreign researchers in “Early Career Researcher” category, which doubled between the years under review. The positive trend in the increase in the number of foreign employees is the result of the long-term efforts and support of UCT Prague to strengthen internationalization in the field of research.

There is a gradual effort towards intergenerational renewal, especially in academic staff positions, with a gradual reduction in the number of employees in the age categories 60-69 and 70+. This applies in particular to the position of professor, where a relative decrease of 30% in the 60+ category can be observed between 2024 and 2020. On the positive side, the proportion of staff in the assistant professor position in the under-29 age category is increasing (a relative increase of 43% between 2020 and 2024).

The technical and economic staff numbers increased from approx. 191 (year 2020) to 220 (year 2024). The reason is in the need for implementation of new agendas connected with gradual changes in legislation and adoption to changed situation, such as security issues.

4.5.1 Staff involved in R&D&I of the university (FTE) in the period under review

| Academic/professional position | Total 2020 | Of which women [%] | Of which foreign [%] ⁴ | Total 2024 | Of which women [%] | Of which foreign [%] |
|--|------------|--------------------|-----------------------------------|------------|--------------------|----------------------|
| Professor | 72,1 | 11,3 % | 0,0 % | 79,1 | 7,9 % | 1,3 % |
| Associate Professor | 108,4 | 28,7 % | 0,2 % | 113,6 | 27,6 % | 2,1 % |
| Assistant Professor | 274,1 | 43,8 % | 2,0 % | 294,9 | 35,6 % | 2,9 % |
| Assistant | 16,5 | 40,0 % | 4,0 % | 21,0 | 29,6 % | 9,5 % |
| R&D Personnel ⁵ | 0 | 0,0 % | 0 | 0 | 0,0 % | 0 |
| Researchers in other categories ⁶ | 352,2 | 46,3 % | 18,4 % | 416,0 | 35,1 % | 22,4 % |
| Technical and economic staff ⁷ | 191,9 | 72,1 % | 1,6 % | 220,6 | 54,4 % | 1,1 % |
| Early career researcher ⁸ | 123,3 | 39,8 % | 13,1 % | 170,6 | 32,0 % | 19,4 % |
| Scientific, research and development staff involved in teaching activities | 0 | 0,0 % | 0 | 0 | 0,0 % | 0 |
| Total number of foreign nationals | 96,4 | 46,7 % | 73,3 % | 136,6 | 61,6 % | 78,0 % |

Note: The categories professor, associate professor, assistant professor, assistant, other scientific, research and development staff, scientific staff not falling into other categories and technical and economic staff are mutually exclusive, i.e. one staff member is reported under one category only. Scientific, research and development staff involved in teaching activities, as well as early career researchers are reported collectively for all the above-mentioned categories.

Note: The average number of hours worked is calculated as the ratio of the total number of hours actually worked during the reference period, from 1 January to 31 December, by all staff (including agreement on work activity, excluding agreement on work performance) to the total annual working time pool per full-time employee. The full-time status of the worker in the evaluated unit is always reported. If an employee holds more than one type of full-time job within the evaluated unit, the total sum of the two shall be reported.

⁴ Researchers with Slovak citizenship are not considered foreign.

⁵ The category "Other scientific, research and development personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

⁶ The category "Researchers not falling under other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

⁷ Who participates in the management and support of R&D&I in the institution.

⁸ See Definition of Terms in Methodology HEI2025+.

4.5.2 Percentage of HEI's staff involved in R&D&I, categorized by age structure, job title, and gender in the year 2020 (number of physical employees and staff)

| Academic/professional position | Under 29 years [%] | | 30-39 years [%] | | 40-49 years [%] | | 50-59 years [%] | | 60-69 years [%] | | 70 years and over [%] | |
|--|--------------------|--------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0,00% | 0,00% | 0,07% | 0,00% | 0,86% | 0,07% | 1,58% | 0,07% | 2,51% | 0,43% | 1,79% | 0,29% |
| Associate Professor | 0,00% | 0,00% | 1,00% | 0,29% | 3,51% | 1,00% | 2,36% | 1,00% | 2,08% | 0,72% | 1,07% | 0,14% |
| Assistant Professor | 0,14% | 0,00% | 10,32% | 4,51% | 8,24% | 3,65% | 3,65% | 2,36% | 2,08% | 0,86% | 0,43% | 0,07% |
| Assistant | 0,14% | 0,07% | 0,93% | 0,43% | 0,36% | 0,00% | 0,14% | 0,07% | 0,07% | 0,07% | 0,00% | 0,00% |
| Early career researcher ⁹ | 7,2% | 2,9% | 83,1% | 35,1% | 7,2% | 2,9% | 0,70% | 0,70% | 0,70% | 0,00% | 0,00% | 0,00% |
| R&D Personnel ¹⁰ | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |
| Researchers in other categories ¹¹ | 20,92% | 10,24% | 12,11% | 4,87% | 4,01% | 2,01% | 1,43% | 1,15% | 1,29% | 0,21% | 0,72% | 0,29% |
| Technical and economic staff ¹² | 1,65% | 1,15% | 3,30% | 2,22% | 5,73% | 4,58% | 3,37% | 2,51% | 1,43% | 1,00% | 0,72% | 0,21% |
| Scientific, research and development staff involved in teaching activities | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |

Note: The total number of employees/workers as of 31.12. of the calendar year in question is to be given, irrespective of the proportion of full-time equivalents, but only in an employment relationship, i.e. not including persons working parttime agreements. Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

⁹ See Definition of Terms in Methodology HEI2025+.

¹⁰ The category "Other scientific, research and development personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹¹ The category "Researchers not falling under other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹² Who participates in the management and support of R&D&I in the institution.

4.5.3 Percentage of HEI's staff involved in R&D&I, categorized by age structure, job title, and gender in the year 2024 (number of physical employees and staff)

| Academic/professional position | Under 29 years [%] | | 30-39 years [%] | | 40-49 years [%] | | 50-59 years [%] | | 60-69 years [%] | | 70 years and over [%] | |
|--|--------------------|--------|-----------------|--------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------------|-------|
| | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women | Total | Women |
| Professor | 0,00% | 0,00% | 0,07% | 0,00% | 1,23% | 0,14% | 1,77% | 0,14% | 1,77% | 0,00% | 1,77% | 0,55% |
| Associate Professor | 0,00% | 0,00% | 0,89% | 0,27% | 3,27% | 1,16% | 1,98% | 0,75% | 2,11% | 0,95% | 0,89% | 0,27% |
| Assistant Professor | 0,20% | 0,20% | 8,39% | 3,55% | 10,03% | 4,98% | 3,34% | 1,98% | 1,84% | 0,82% | 0,41% | 0,07% |
| Assistant | 0,14% | 0,00% | 0,61% | 0,20% | 0,48% | 0,27% | 0,20% | 0,00% | 0,27% | 0,27% | 0,00% | 0,00% |
| Early career researcher ¹³ | 5,92% | 3,95% | 86,84% | 39,47% | 5,92% | 2,63% | 1,32% | 0,66% | 0,00% | 0,00% | 0,00% | 0,00% |
| R&D personnel ¹⁴ | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Researchers in other categories ¹⁵ | 20,53% | 10,23% | 13,30% | 6,68% | 3,89% | 1,91% | 1,64% | 0,95% | 1,16% | 0,48% | 0,82% | 0,27% |
| Technical and economic staff ¹⁶ | 1,02% | 0,61% | 3,21% | 2,18% | 5,25% | 4,30% | 4,43% | 3,41% | 2,59% | 1,84% | 0,48% | 0,14% |
| Scientific, research and development staff involved in teaching activities | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% | 0,00% |

Note: The total number of employees/workers as of 31.12. of the calendar year in question is to be given, irrespective of the proportion of full-time equivalents, but only in an employment relationship, i.e. not including persons working parttime agreements. Other types of contractual relationships under the Civil Code that involve purchase of services are not included.

¹³ See definitions in Methodology HEI2025+.

¹⁴ The category "Other scientific, research and development personnel" includes technical and professional personnel who are not directly involved in R&D&I but are indispensable for the research activity (e.g. operators of research facilities).

¹⁵ The category "Researchers not falling under other categories" includes all other staff who cannot be classified under any of the above categories (e.g. independent researcher/scientist).

¹⁶ Who participates in the management and support of R&D&I in the institution.

4.6 Academic and Research Careers

The HEI will briefly describe the central system for HR recruitment, placing particular emphasis on recruitment from outside the HEI, especially from abroad, as well as system of career development of academic and research staff, if such system exists. Information will be provided on:

- Career development rules and legislation related to the recruitment and career development of domestic and foreign employees (e.g. Career Code, HR Award, OTMR policy, etc.).
- International tenders.
- The process of new employee adaptation and mentoring.
- Transparent distribution of institutional time, attitudes towards chaining of contracts and senior academic positions.
- Rules for filling senior positions in the context of R&D&I.
- The rules and support system of sabbaticals.
- Measures for the return of workers after a stay in an external workplace, including a foreign workplace.
- Arrangements for workers to return after maternity/parental leave or other career breaks (e.g. caring for family members).
- Other relevant information at HEI discretion.

The HEI shall provide a reference to an existing career code or similar document (if one exists). The HEI shall describe the effectiveness of the systems used with examples (e.g. a model example of the adaptation process, a specific anonymised example of an academic's career path, statistics on the return after maternity/parental leave or career breaks before and after the implementation of the measures, etc.).

Maximum 300 words per point.

Self-assessment:

Transparent procedures and equal non-discriminatory treatment are applied in all processes within UCT Prague. In connection with the implementation of the HR Award Action Plan in the framework of human resources management, key processes in the area of recruitment and selection of employees, career management, evaluation and remuneration system, and last but not least processes aimed at employee care are gradually being revised and updated. In 2024, the documents governing the recruitment process i.e.:

- Rules of Selection Procedure for Filling Academic Positions at UCT Prague
- Rules of Selection Procedure for Filling Positions of Heads of Institutes and Departments at UCT Prague (academic staff)
- Rules of Selection Procedure for Filling Positions of Heads of Workplaces at UCT Prague (technical and economic staff).

A draft of a new regulation has been prepared to unify and regulate the procedures for selection procedures within the institution. The new document covers all positions compared to the original regulations and clear procedures are defined for the recruitment process for individual groups of employees. The document will be further complemented by a Methodological Guideline and will include recommendation templates for advertising standard positions. These procedures will also focus on recruitment from abroad. The advertisement of vacant positions is available on the website of UCT Prague, on the official notice board and in online advertising portals, according to the type of vacancy, e.g. EURAXESS. The updated version of the Regulations has already been discussed by the Academic Senate, approval and registration at the Ministry of Education and Science and subsequent publication on the University's website is expected during the first quarter of 2025.

The qualitative change in the support for the recruitment of foreign staff is evident from the comparison of the values of the share of foreign staff between 2020 and 2024, when the overall share increased by more than 17%. The selection procedures for this group of staff are not different in content from the regular recruitment. The only differences are in the practicalities, such as communication in English, higher use of online meetings for interviews and electronic communication in general. There are no 'special' criteria linked solely to the fact that they are foreigners, even for non-EU workers.

The process of employee adaptation is also an area that is addressed in the implementation of the HR Award Action Plan. The aim of the draft adaptation process, which was submitted to the management of UCT Prague in the second half of 2024, is to support the orientation of the employee within the working environment of the University. The aim is to familiarize the employee with the formal and informal structures of the workplace during this period, to ensure the fastest possible integration into the standard work process aimed at achieving the required performance. The adaptation period also includes support for the development of further professional growth and career support in the form of identifying training needs. The general template for an adaptation plan is divided into three main areas - legal requirements, specific requirements and development needs. Each process will then be individualised in relation to the specific job and employee. The adaptation plan will be developed by the employee's manager in conjunction with Human Resources and a mentor who will be designated by the workplace for the training period. An adaptation period is foreseen not only for newly recruited employees, but also in the course of career development when moving to a different job or returning after a prolonged absence due to, for example, childcare or other obstacles, either on the employee's side or on the employer's side. The length of the adaptation process will then be adapted to the specifics of the job, with the minimum length being at least the statutory probationary period, which is currently three months. The whole process will be carried out fully electronically via the HRIS. All participants in the adaptation process will thus have information on the current status and progress of the employee's adaptation throughout this period.

The basic principles of the career regulations for academic staff are currently contained in the documents *Attestation and periodic evaluation of research and academic employees*, *Rules of Habilitation Procedures* and *Procedures for Appointment of Professores at the UCT Prague*.

According to the current rules, each academic staff member who reaches the prescribed minimum qualification requirements has the opportunity to submit an application for attestation or habilitation proceedings or for appointment as a professor to the Dean of the relevant faculty or, in the case of centra or research university units, to the Vice-Rector. The application shall be considered and the outcome decided by the relevant committee. In the event of a positive assessment, the staff member is transferred to the corresponding position and his/her salary classification is adjusted.

The University uses the electronic Employee Profile form for regular evaluation of the activities and performance of academic, scientific and research staff, which is continuously optimised. It contains a summary of information about the employee, which is broken down into several areas, which are: basic information about the employee/workplace; overview of creative activities (publication activities, submitted/resolved grants, additional activities); overview of teaching activities (teaching, examination, conducting qualification papers, practice and excursions, lifelong learning and Universities of 3rd Ages, summer school, youth academy); overview of other activities (performance of managerial functions, serving on university bodies, committees and councils, representation of UCT Prague in professional associations and organisations, media and promotional activities, etc.); financial data (financial contribution to R&D and educational projects, financial contribution to the contractual cooperation, financial value of contact hours of teaching, paid personal expenses).

UCT Prague supports the professional development of its employees mainly by participating in professional conferences and workshops at home and abroad and by organising its own professionally focused events. The personal development of employees is ensured internally mainly in the form of further education in the form of courses focused mainly on soft skills. Specific courses are organised based on the identification of employees' training needs. These are further supplemented by the possibility of online courses and language courses. In justified cases, employees can take external courses, where the diverse focus of the participants is a great advantage.

Employee mobility takes place through internships at both foreign and domestic sites. The trips are organised through the staff member's home department and mainly concern academic and research staff positions. Very limited use is made of the Erasmus+ programme for administrative staff. Short-term placements are up to six months in length and are mostly linked to a specific cooperation project. Longer stays take place e.g. within the framework of the Czech Science Foundation Postdoc individual fellowship - outgoing projects.

Another tool to support career development is the possibility to take a so-called sabbatical. This is granted for the purpose of creating a significant pedagogical or scientific result or for a stay where the employee gains experience essential for his/her professional growth and successful performance at UCT Prague. Sabbatical is granted for a minimum of 6 months and an academic employee may apply for it once every 7 years. The conditions for granting sabbatical are regulated by the relevant internal guidelines.

Further support for young scientists is provided by the UCT Prague through the so-called start-up grants funded by the Dagmar Procházková Fund, under which young researchers with international experience can receive financial support for a three-year initiation project.

The area of employment relations is governed by current legislation, which is further regulated by internal standards and regulations. One of the important areas is to solve the problem of repeated extension of employment contracts. This is done fully in accordance with the law at UCT Prague and chaining is used in cases that the law allows, these cases are further supplemented and explained by internal rules.

There are specific conditions offered for the cases of the return after the maternity leave, such as possibility of the reduced working hours or the use of Zkumavka childcare center. Currently, university is preparing the grant system for the support of researchers after maternity leave. In the initiation period, the financial support by operational program (OP JAK) is expected, the project proposal is currently under preparation.

Examples:

- Model example of the adaptation process

To facilitate the adjustment of new PhD candidates, as a young researchers, it has been introduced an onboarding process using a "[adaptation plan](#)" tool, which emphasizes close collaboration between student and supervisor. During this process, they work together to address key areas such as study requirements, professional guidance, teamwork and effective communication. These regular meetings help clarify mutual expectations and track progress, while building a supportive and constructive relationship.

- specific example of an academic's career path

1. Prof. Pavel Novák gained his PhD at UCT Prague in 2006 in Metallurgy. During PhD study and also already at previous master level, he was highly interested in industrial processes, so he worked as a part-time worker in several companies related with the study subject. After finishing PhD study, he started to work at UCT as a researcher and brought a new topic –

powder metallurgy of intermetallics. He became associate professor in 2011. After that, he acted as a vice-chair of COST Action and started strong international cooperation. In years 2014 – 2024 he served as a vice-dean of the Faculty of Chemical Technology of UCT Prague. He became a full professor in 2022. Currently, he is a vice-rector for research and development and simultaneously he is still giving lectures in metallurgy-oriented subjects and continues in his research.

2. Dr. Petr Kovaříček gained his PhD at Strasbourg University at the Institute of Supramolecular Chemistry under the supervision of Prof. J-M.Lehn. Afterwards, he completed a PostDoc position at Humboldt University in Berlin and J. Heyrovsky Institute of Physical Chemistry Czech Academy of Science in Prague. In 2021, thanks to start-up grants from UCT Prague (Dagmar Procházková Fund) and Experientia Foundation, he established a junior research group at the Department of Organic Chemistry, Faculty of Chemical Technology in the field of Dynamic systems chemistry for adaptive organic materials. In 2025 he will apply for the habilitation procedure in the field of Organic Chemistry.

- Example of an academic sabbatical

In the evaluation period, prof. František Štěpánek spent his sabbatical in year 2021 at Rutgers University in New Jersey, USA. The stay was financed by Fullbright scholarship.

4.7 Gender equality measures

The HEI will briefly describe the measures relating to the application of gender equality in the areas required for assessment criteria 4.5, 4.6, with an emphasis on:

- Gender equality in recruitment and career development.
- Legislation and documents regulating gender equality (e.g. Gender Equality Plan, Action Plans, strategic documents for equality, including links to overarching strategies, etc.).
- The filling of leadership positions (including gender balance in leadership positions, see Table 4.7.1).
- Nominations to professional bodies.
- Evaluation and remuneration.
- Measures to reconcile the work and family life of researchers (flexible working hours, flexible forms of work, maternity/parental leave management, facilitating child/dependent care, age management in relation to gender).
- Measures to eliminate negative workplace behaviour such as mobbing and sexual harassment.

The HEI shall provide evidence of the examples from practice (e.g. use of flexible working hours, dealing with cases of mobbing or sexual harassment, compliance with the principles of gender equality in HEI professional bodies, etc.).

Maximum 300 words per point.

Self-assessment:

For the period 2022-2026, a [Gender Equality Plan](#) has been prepared, which was based on UCT's activities in this area and on European projects focusing on Gender Equality. Other documents reflecting measures to promote gender equality are the HRS4R Action Plan <https://www.vscht.cz/career/hr-award>.

Recruitment is formalised in internal regulations. The Rules of the Recruitment procedure now unify the recruitment process for all positions across the University and its units. General rules and principles of a level playing field for all candidates are defined, and the requirement for transparency, including respect for gender equality is emphasised. The rules for advertising are prepared on the basis of the catalogue of job positions created. A partnership with vedavyzkum.cz and researchjobs.cz portals has been established and advertising on the Euraxess portal is being carried out through this partnership.

Nominations to academic bodies are made transparently on the basis of internal regulations/statutes and rules of procedure.

In order to promote the consideration of gender aspects in research and pedagogical work, the **Julia Hamáčková Prize** was established in order to promote the consideration of gender aspects in research and pedagogical work. The prize is awarded annually in three categories:

- Category a) Public award for outstanding contribution of women employees of UCT Prague to the development of science, research, pedagogy and innovation, including activities in the academic sphere
- Category b) Public award for outstanding contribution of male and female employees of UCT Prague in the field of support and promotion of equal opportunities in labour relations and research at UCT Prague
- Category c) Competition of student theses prepared by female and male students of Bachelor, Master and Doctoral degree programmes who incorporate gender and/or sex analysis in their research.

UCT Prague intensively supports the harmonisation of work and family life of its employees, e.g. the possibility to negotiate lower working hours, flexible working hours or the possibility to work from home. Lower hours are used for female employees after maternity and parental leave, which facilitates their return to work and at the same time care for minor children. As of 31.12.2024, part-time jobs accounted for more than 33 % of the total number of employees, while women accounted for more than 17 %. This trend has been sustained compared to 2020.

Further supporting the return of female employees to the workplace is the **Childcare Center Zkumavka**, which has been providing care for employees' preschool children since 2013. This benefit is perceived very positively by employees, as evidenced by a survey conducted in 2024 as part of the project entitled *Human Resource Management Strategy*, funded by the Ministry of Education, Youth and Sports for the Preparation and Implementation of the Doctoral Reform and the Human Resource Management Strategy 2024-2025, the evaluation by employees shows that in addition to quality services, they benefit from a certain degree of flexibility in using this benefit. Further support for staff returning to work after a long-term absence is a suite of information available on the University's intranet.

As part of the *Human Resource Management Strategy project*, e-courses for academic staff and e-courses for non-academic staff *have been* implemented focusing on work-life balance

The promotion of equal access and the principles of the updated Code of Ethics is complemented by the strengthening of social safety, this now allows staff to report or consult on conduct within the University in which they perceive as a conflict with ethical principles. Reports may relate to, for example, misunderstandings between supervisors and subordinates, co-workers, interpersonal conflicts, ambiguities in UCT Prague policies and procedures, unfair treatment, bullying, sexualised behaviour, etc. in educational, creative and other activities. A significant enhancement in this area was the creation of the position of campus ombudsperson in early 2025.

4.7.1 Gender balance in management positions

| Senior staff | 2020 | | 2024 | |
|--------------------------------------|------|-------|------|-------|
| | Men | Women | Men | Women |
| Rector | 1 | 0 | 1 | 0 |
| Vice-Chancellor | 4 | 0 | 4 | 1 |
| Dean ¹⁷ | 4 | 0 | 4 | 0 |
| Academic Senate | 16 | 5 | 18 | 4 |
| Scientific/Artistic/Academic Council | 21 | 2 | 26 | 2 |
| Quaestor | 1 | 1 | 1 | 1 |
| Board of Directors | 10 | 1 | 9 | 2 |

Note: If one person holds more than one of these positions within the HEI, he/she will be counted in each.

¹⁷ or other head of a relevant work unit of a higher education institution under Section 22(1) of the Higher Education Act performing R&D&I activities, regardless of the designation.

4.8 Mobility of academic and research staff (including sectoral and inter-sectoral mobility)

The HEI shall describe in a concise and structured manner its strategies and objectives for the mobility of academic and research staff (including PhD students), with particular emphasis on mobility related to the development of excellent science and interdisciplinary (intersectoral) mobility. The HEI shall identify potential barriers to mobility, including gender-based barriers. The HEI shall provide information on long-term stays abroad by its own academic staff or, conversely, by foreign staff at the HEI being evaluated.¹⁸

The achievement of the set objectives will be demonstrated by the HEI by describing specific examples of mobility or by brief statistics on mobility during the period of 2020–2024.

Maximum 500 words plus 200 words for each example given (max. five examples with a specific description of the relevance of mobility to the stated objectives).

Self-assessment:

The strategy and objectives of international and intersectoral mobility of researchers for 2020 - 2024 are defined in the Strategic Plan for 2021 - 2024 as follows:

- Promoting international cooperation with selected foreign universities
- Promotion of two-way mobility supported by Erasmus+ grants and other programmes
- Developing internal internationalisation by including an international dimension in curricula and strategies for educational and creative activities.
- Promoting language and intercultural training
- Expanding the foreign language website
- Provision of comprehensive information services
- Effective cooperation with the application sphere

Barriers: insufficient affordable accommodation in Prague, legislative and administrative complexities in the areas of visa policy, international labour law, social security, health insurance and international income taxation, lack of desirable exemptions for researchers in some areas (e.g. international income taxation).

Gender-based barriers:

- For newcomers: shortage of paediatricians, high tuition fees in English-language educational institutions for children (6-19 years).
- For out-going researchers: lack of financial support to provide childcare for pre-school children, to cover the costs of family members travelling for long-term placements, i.e. children's school fees, health insurance abroad

Infrastructure and services newly created or expanded between 2020 and 2024:

- A **Welcome Office** was established within the Department of International Relations in 2020 to provide assistance to incoming international researchers and PhD candidates, and a new website was designed and launched (<https://international.vscht.cz/international-staff>) with detailed information for newcomers and already resident foreigners and their family members. The Welcome Office of UCT Prague has joined the national network **EURAXESS Centre of the Czech Republic**.
- An electronic application/registry **MobIS** (Mobility Information System) has been designed, implemented and launched in 2020, which concentrates information on newly arriving foreigners, includes both short-term visits and long-term stays, not only employed but also visiting persons, from all countries of the world. The registry also sets up approval processes by the respective heads of departments and deans of faculties, is also linked to the Human

¹⁸ Long-term mobility means an uninterrupted period of more than three months.

Resources Department, tracks the expiry dates of residence permits in relation to employment contracts and notifies the relevant staff of the need for related administrative solutions for the foreign worker in question.

- The Project Centre manages international R&D cooperation projects in which our scientific teams are successfully involved <https://www.vscht.cz/research/research-profile/projects>.

Examples and statistics on international cooperation and mobility

1. There were/are implemented also mobility projects funded by Horizon (2020 and Europe) - MSCA grants (6) and projects that were not financially supported by MSCA grants but met the required criteria were/are funded by the [MEYS](#) from ESF+ , Operational programmes, such as those with the acronym ChemJets UCT Prague (22 incoming researchers), Chemical Fellows (34 incoming and 8 outgoing researchers) in which long-term mobility was funded, usually for 2 years.
2. Within the framework of the [the Czech Science Foundation \(GACR\)](#) scheme Postdoc Individual Fellowship, outgoing mobility of 6 researchers for two-year scientific internships to workplaces in Europe were supported. Within the Fulbright Masaryk Scholarship. 2 researchers and 1 PhD candidate carried out research internships at universities in the USA (from 4 to 8 months).
3. At the same time, foreign researchers /postdocs and PhD candidates were involved in R&D research projects funded by various national and foreign agencies. International mobility, especially long-term stays internationals have increased significantly thanks to the projects supported by the ESF, Operational programmes R&D&E and JAc, and HORIZON Europe programmes. UCT Prague also played a significant role in hosting students and researchers from Ukraine after the outbreak of war with Russia.
4. Doctoral candidates completed internships abroad under the ERASMUS + grants. Long-term trips from 1 to max. 12 months were completed in the years 2020-2024 by a total of 193 students, of which 160 on internships in the EU/EEA and Switzerland. 154 short-term internships of up to 1 month were carried out, of which 109 were to research institutes in EU/EEA and Switzerland countries.
5. The UCT international department records trips of researchers and academics abroad. The purpose of short-term trips broad was and still is mainly active participation in conferences, seminars, workshops, working meetings of researchers of collaborative international projects, preparation of new projects, meetings of professional groups and international scientific boards. The trips are also focused on teaching activities at foreign universities, teaching in the framework of joint study programmes "Double Degree (DD)" and defending doctoral theses under joint supervision. In 2020, UCT Prague researchers went on only 100 foreign trips. There was a significant decrease in staff mobility compared to the previous year, which was caused by the global pandemic of the COVID19 disease; unfortunately, this trend continued in the following two pandemic years. In 2023, international mobility has already taken off, with a total of 674 foreign business trips, mostly to EU countries. A total of 90 foreign guests arrived during 2023 as part of teaching or scientific cooperation. In 2024, the number of foreign trips has already reached the pre-COVID- 19 numbers, short-term stays of employees and PhD students with employment relationship up to 5 days were recorded in total 915, of which 378 to European countries, Long-term trips over 5 days and longer were recorded in total 192, of which 24 to European countries. The number of countries visited was 61, of which 32 were European countries. As far as foreign researchers, employed PhD candidates and guests are concerned, in 2024 UCT Prague registered 168 foreign persons. Of these, 85 foreigners came for short stays, up to 14 days, 6 foreigners for stays of 14-30 days and 84 foreigners for long-term stays, i.e. for the positions of R1 and R2 researchers. 84 foreigners were from EU/EEA countries and Switzerland and 84 from third countries of the world. The short-term hosting of foreign

academics is regularly supported by UCT Prague through annual competitive calls (<https://www.vscht.cz/research/support-of-short-term-hosting>).

Cross-sectoral cooperation covers several areas:

- Research and development: researchers from UCT Prague participate in a number of research projects funded from public sources within the framework of projects of domestic providers and from non-public sources within the framework of direct contractual cooperation with industry. Within the framework of applied research projects of at least three years duration, conceptual research and development is carried out with the active involvement of students of doctoral and master's degree programmes
- The European project DocEnhance (<https://docenhance.eu/>) - developing an employment and innovation-oriented curriculum for PhD programmes, facilitating business-education partnerships, and tracking PhD graduate career paths - has been focused on supporting cross-sectoral experiences and mobility of PhD students in the years 2020 to 2022.
- Thanks to the cooperation of several rectorate departments, the Institute of Economics and Management and the Maker Institute, the European consortium project EIT HEI DETECT! was successfully implemented at the UCT Prague in 2023, which aims to connect universities focused on STEM fields in combination with "Deep Tech" disciplines with institutions with experience in entrepreneurial schemes and with industrial partners and third sector organisations.

RESEARCH INFRASTRUCTURE

4.9 Research infrastructure

The HEI will describe the system for acquiring/optimizing expensive instruments and equipment, as well as refurbishing outdated expensive instruments. The HEI will also briefly present the internal organisation of the research infrastructure (including technology, expensive instruments, and instrumentation)¹⁹. The HEI will describe the system of sharing (including external research entities) of instruments and instrumentation, including expensive instruments and instrumentation units, referred to as 'core facilities' (if such a system exists). The HEI will demonstrate the effectiveness of the systems with examples (e.g., specific instruments acquired/optimised and their relevance to the achievement of research objectives, examples of sharing of expensive instruments and instrumentation, statistics on sharing of expensive instruments and instrumentation, etc.). The HEI will briefly comment on the data in Table 4.9.1.

The HEI shall also indicate whether it hosts large research infrastructure projects. The name and a brief description will be provided.

Maximum 500 words plus 200 words for each example given (max. five examples).

Self-assessment:

The instruments and equipment needed for the research works are located inside the evaluated units (faculties and Technopark) and also in Central laboratories, which work as a core university facility. There are plans for purchasing and renewal of the equipment for both faculties and Central laboratories updated annually and presented as a part of strategic documents to the MEYS. These plans serve also as a list of priorities for planned infrastructural projects, such as "Equip PhD" project funded by Programme Johannes Amos Comenius, which was solved in the evaluated period and will be completed in 2025.

¹⁹ The definition of research infrastructure is set out in the Framework for State Aid for Research, Development and Innovation (2014/C 198/01) and Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in accordance with Articles 107 and 108 of the Treaty.

Core university facilities

Costly analytical instruments are concentrated in a core facility called the Central Laboratories (CL) of UCT Prague. This facility consists of nine laboratories, including those for elementary analyses, NMR spectroscopy, molecular spectroscopy (infrared, Raman, and UV/VIS spectroscopy), atomic absorption spectroscopy, X-ray analyses (diffraction and spectrometry), mass spectrometry, thermal analyses, electron spectroscopy for chemical analysis (ESCA), and transmission electron microscopy. The CL provides analytical services to students and university staff members through "internal invoices," where fees are charged for services performed, covering the operation of laboratories, including the operation and maintenance of all instruments. Additionally, the CL also provides paid analytical services to external clients, charged at market prices. The purchase and modernization of devices are funded from the university's investment funds.

Development of IT infrastructure

Relatively significant financial resources at the central university level have been devoted to the renewal and development of the IT infrastructure to meet the stringent requirements for cybersecurity, to cover the requirements for reliability and speed of connectivity, and at the same time to meet the significantly increasing need for data storage and management (in line with the Open Science policy). In the period 2020-2024, we can specifically mention the significant modernisation of the disk array (investment of CZK 23.5 million), the purchase of HW and SW for monitoring and management of IT security (investment of CZK 5 million), the renewal of the backup data centre (investment of CZK 3 million) or the renewal and strengthening of the computer network and network elements (investment of CZK 5 million).

Participation on large research and development infrastructures

UCT Prague is involved in partnerships and activities within **Czech large research and development infrastructures**. These partnerships are a means of deeper involvement in the European Research Area and are important for increasing the competitiveness of research teams and the whole school. In the period 2022-2024, the teams of UCT Prague have been involved in the following large research infrastructures through consortium agreements:

- **Czech National Node of the European Infrastructure for Translational Medicine ([EATRIS-CZ](#))**

EATRIS-CZ is the Czech national hub of the European Infrastructure for Translational Medicine (EATRIS-ERIC), linking top biomedical research centres in the Czech Republic. The aim is to accelerate the transfer of scientific knowledge into clinical practice, especially in the development of drugs, vaccines and diagnostics. The Czech Republic has been a member since 2011. The infrastructure comprises 11 institutions and five research platforms: advanced therapeutics, imaging, small molecules, vaccines and biomarkers. It provides expertise in genomics, proteomics, metabolomics or molecular imaging.

- **Czech National Infrastructure for Biological Data ([ELIXIR-CZ](#))**

The Czech National Infrastructure for Biological Data, abbreviated ELIXIR CZ, is a distributed research infrastructure for bioinformatics that has arisen from an advanced computational environment. It offers the use of the specialized databases and unique tools free of charge to the national and international life science research community. ELIXIR CZ is comprised of research performing organizations across the Czech Republic, with its headquarters in the Institute of Organic Chemistry and Biochemistry of the Czech Academy of Sciences. Beyond the Czech Republic, ELIXIR CZ is a partner organization of the European Research Infrastructure for Life Science Data, an intergovernmental organization which coordinates and develops life science resources across Europe.

- **National Infrastructure for Chemical Biology ([CZ-OPENSREEN](#))**

CZ-OPENSREEN is a state-of-the-art infrastructure for chemical biology and genetics offering open access to potential users. The mission is to identify new molecular probes and to develop new tools for the research of chemical compounds – candidates for the development of new potential therapeutics.

- **Infrastructure for the Promotion of Metrology in Food and Nutrition in the Czech Republic ([METROFOOD-CZ](#))**

METROFOOD-CZ is a new and unique research infrastructure for food and nutrition. Its main objective is to conduct and support new interdisciplinary research in areas ranging from primary agricultural production, food processing and technology, to the quality, authenticity, safety and traceability of food, raw materials, products and dietary supplements. METROFOOD-CZ not only enables the use of state-of-the-art instrumentation for the analysis of agricultural products and foodstuffs, the possibility of experiments in experimental fields and stables, the development of new food products and the testing of innovative technologies, but also offers top experts in the agri-food sector and relevant metrology.

In 2024, the implementation of two projects under the Programme Johannes Amos Comenius, in which UCT Prague is a partner, was also launched, aiming at the modernisation of the two above-mentioned infrastructures - CZ-OPENSREEN and METROFOOD-CZ.

4.9.1 Summary of expenditure/costs on research infrastructure and equipment for the period under review (including related non-investment and personnel costs).

| Costs/expenses in thous. CZK/EUR/year | 2020 | 2021 | 2022 | 2023 | 2024 | Total value of assets ²⁰ |
|---|----------------------|----------------------|---------------------|-----------------------|-----------------------|-------------------------------------|
| Costs/expenses related to the acquisition of small fixed assets for R&D&I | 516 / 20 | 605 / 24 | 396 / 16 | 316 / 13 | 149 / 6 | 1982 / 79 |
| Cost of repairs and maintenance of equipment | 8 330 / 326 | 9 689 / 382 | 6 762 / 267 | 6 972 / 275 | 6 991 / 276 | 38 744 / 1 526 |
| Acquisition of tangible (DH) and intangible (DN) assets for R&D&I (investments) | | | | | | |
| Of which software | 32 / 1,3 | 1 040 / 41 | 340 / 13 | 0 / 0 | 44 / 2 | 384 / 57 |
| Of which other intangible fixed assets | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Of which land, buildings and structures | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 |
| Other intangible fixed assets (machinery, apparatus, equipment, etc.) | 38 350 / 1513 | 57 664 / 2275 | 13 544 / 534 | 45 788 / 1 806 | 64 782 / 2556 | 220 128 / 8 684 |
| Total infrastructure spending in years²¹ | 38 382 / 1514 | 58 704 / 2315 | 13 884 / 548 | 45 788 / 1 806 | 64 826 / 2 557 | 221 512 / 8699 |

²⁰ Enter the sum of the row.

²¹ Enter the sum of the column.

FINANCES

4.10 Budget and structure of financial resources

The HEI shall provide and comment on an overview of the total R&D&I budget in the period of 2020–2024, broken down by organisational units of the evaluated HEI and by source of funds (Table 4.10.1). The HEI shall also comment on the shares of total costs/outputs covered by public and non-public sources by type of R&D&I for the period under evaluation as shown in Table 4.10.2.

As complementary data, the university will provide an overview of prestigious research projects obtained during the period of 2020–2024 (ERC²², MSCA²³, HHMI²⁴, HFSP²⁵, NSF²⁶, Horizon Europe²⁷, NIH²⁸, Wellcome Trust²⁹, EDF³⁰, OP JAK³¹, OP TAK³², NPO³³, GA ČR³⁴, TA ČR³⁵ etc.). Include information on the amount of funding received and whether the HEI were principal investigator or co-investigator in Tables 4.10.3, 4.10.4 and 4.10.5.³⁶

In addition, the HEI will describe in more detail up to five of the most important projects from the list of prestigious individual projects abroad (ERC, MSCA, HHMI, HFSP, NSF, etc.), providing basic information at the HEI's discretion and regardless of the funder: title, field of expertise, agency, amount of funding, other project participants, and other relevant information as appropriate.

A maximum of 500 words plus 200 for each example of a prestigious international individual project given.

Self-assessment:

The budget of the units of UCT Prague depends on size and related research capacity of the particular unit. The ratio between national and international funding is almost comparable for all faculties, while the Technopark is showing higher amounts of foreign funding. The reason is in solution of EU project as the applied research partner, as well as the collaborative and contractual research with foreign partners. In last two years, the ratio between fundamental and applied research/experimental development is changing slightly, preferring the fundamental one. The

²² The European Research Council (ERC) is part of the 'Excellent Science' pillar of Horizon Europe. The ERC funds cutting-edge research by supporting individual Principal Investigators and their research teams.

²³ Marie Skłodowska-Curie Action (MSCA) is part of the "Excellent Science" pillar of Horizon Europe and is also aimed at supporting young researchers, including PhD students.

²⁴ Howard Hughes Medical Institute - a non-profit organization in the USA significantly supporting international biomedical research.

²⁵ Human Frontier Science Program - an international programme to support research, particularly in the natural sciences and computer science.

²⁶ National Science Foundation (USA).

²⁷ Horizon Europe - the EU's 9th Framework Programme for research and innovation, running from 2021-2027.

²⁸ National Institutes of Health (NIH) - an agency under the United States Department of Health and Human Services. NHI is a major player in project support for biomedical research.

²⁹ major UK private foundation supporting mainly biomedical research.

³⁰ European Defence Fund.

³¹ Operational Programme Jan Ámos Komenský - Priority 1 - Research and Development - multiannual programme under the Ministry of Education, Youth and Sports. Within the framework of the OP JAK it is possible to draw financial resources from the European Structural and Investment Funds (ESIF) in the period 2021-2027.

³² Operational Programme Technologies and Applications for Competitiveness. The European Regional Development Fund (ERDF) is available in the period 2021-2027 to co-finance business projects in the areas of research, development and innovation, digitalisation and digital infrastructure, business development, smart and sustainable energy and the circular economy.

³³ National Recovery Plan - under Pillar 5 - Research, Development and Innovation of the National Recovery Plan, the Recovery and Resilience Facility (RRF) is available for the period 2022-2026.

³⁴ Grant Agency of the Czech Republic.

³⁵ Technology Agency of the Czech Republic.

³⁶ The military and the police HEIs, as parts of the organisational unit of the state, are treated specifically in terms of the possibility to participate in the projects.

reason is in large projects funded by the Programme Johannes Amos Comenius for support of excellent science, where UCT Prague was highly successful. The fundamental research is supported especially by Czech Science Foundation and MEYS, while the applied research and experimental development are funded mainly by Technology Agency of Czech Republic and Ministry of Industry and Trade. The ratio between applied research and experimental development was determined as an average of the values declared in the solved projects.

The complete list of projects as a background for Table 4.10.3 is attached [here](#).

We want to present 5 foreign projects that we consider important. At the same time, we want to highlight the diversity of the types of foreign projects being addressed at the institution. For this reason, we are selecting projects from H2020/Europe actions such as RIA, CSA, RFCS, MSCA PF, and Cofund.

1. The **NEWELY (RIA)** project, an EU Horizon 2020 initiative, brings together a consortium of eleven partners comprising renowned research and development centers, small and medium-sized enterprises (SMEs), and a global leader in the gases industry. The consortium covers every aspect of water electrolysis and green hydrogen production, aiming to pave the way to a sustainable future.

Project partners:

- Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany
- Linde AG, Germany
- Fraunhofer UMSICHT, Germany
- HyET Energy, Netherlands
- GreenHydrogen, Germany
- Fundación para la Investigación y la Tecnología Aplicada (FITA), Spain
- Institute for Energy and Environmental Technology (IUTA), Germany
- University of Chemistry and Technology Prague (UCT Prague), Czech Republic
- University of Twente (UT), Netherlands
- University of Bologna (UNIBO), Italy
- University of Alicante (UA), Spain

Total funds for UCT Prague: EUR 111,200

The NEWELY project received the Best Innovation Award at the Clean Hydrogen JU Awards 2022.

2. **ManCoProc (MSCA PF)** held by Emilia Jakubowska represents MSCA PF project titled "Advanced Manufacturing of Drug Substances by Co-Processing with Excipients through Heteronucleation in a Microfluidic Device". In summary, the project aims to enhance the manufacturability of Active Pharmaceutical Ingredients (APIs) to make them suitable for direct compression. This will be achieved by employing co-precipitation and heteronucleation techniques on excipient particles. The project builds on promising advancements in continuous crystallization research and contributes to the evolving shift towards continuous manufacturing in the pharmaceutical industry. ManCoProc is chosen because it received 100 points, i.e. 100% in evaluation and therefore the best result possible. Annually, 25-30 MSCA PF are submitted at UCT Prague.

Total funds for UCT Prague: EUR 119,097

3. **REPARES (CSA)** -Research Platform in Antibiotic Resistance Spread through Wastewater Treatment Plants is a European project dedicated to investigating the spread of antibiotic resistance (AR) within wastewater treatment facilities, aimed to enhance the European community's understanding of AR dynamics in sanitation waterways, aligning with the United Nations' Sustainable Development Goals.

Project partners:

- University of Chemistry and Technology (UCT) Prague, Czech Republic: Project coordination and development of methodologies for the REPARES platform.
- University of Porto (UCP), Portugal: Expertise in wastewater-mediated AR.
- Delft University of Technology (TU Delft), Netherlands: Assistance in securing international project funding.
- Wetsus, European Centre of Excellence for Sustainable Water Technology, Netherlands: Facilitation of non-academic sector collaborations.
- Aalborg University (AAU), Denmark: Integration of the REPARES database with the globally recognized MiDAS database.

Total funds for UCT Prague (coordinator): EUR 301,500

4. **AtHyCor** (Modelling of Hydrogen Activity from Atmospheric Corrosion in Ultra-High Strength Steels for Light Structure Application) is a Research Fund for Coal and Steel (RFCS) project aimed at understanding hydrogen-assisted cracking in ultra-high strength steels (UHSS) used in automotive applications. It is coordinated by the French Corrosion Institute.

Project Partners:

- ArcelorMittal Maizières Research: Provides expertise in steel research and development.
- Voestalpine: Contributes knowledge in steel processing and applications.
- University of Prague (UCT Prague): Offers academic research capabilities in corrosion science.
- RISE Research Institutes of Sweden: Supplies research support in materials technology.
- Technical Institute of Lisbon (IST): Participates with research in materials engineering.

The consortium collaborates to predict hydrogen embrittlement in coated UHSS components exposed to atmospheric corrosion, aiming to develop testing guidelines and enhance the performance of these materials in automotive structures.

Total funds for UCT Prague: EUR 208,014

5. **The Partnership for the Assessment of Risks from Chemicals (PARC)** - COFUND is a European Union initiative aimed at enhancing the assessment of chemical substances to better protect human health and the environment. Launched on May 11, 2022, in Paris, PARC is a seven-year partnership under the Horizon Europe program, with a total funding of €400 million, equally split between the EU and member states.

Objectives:

- Research and Innovation: PARC supports EU and national chemical risk assessment and management bodies by providing new data, knowledge, methods, networks, and skills to address current and emerging chemical safety challenges,
- Capacity Building: The partnership aims to strengthen existing research capacities by establishing EU-wide, cross-disciplinary platforms, thereby giving new impetus to chemical risk assessment.
- Consortium: PARC brings together close to 200 institutions from 29 countries, including national agencies, research organizations, and EU bodies such as the European Chemical Agency (ECHA), the European Food Safety Authority (EFSA), and the European Environment Agency (EEA). The partnership is coordinated by the French Agency for Food Safety, Environmental Protection, and Occupational Health (ANSES)

Total funds for UCT Prague: EUR 200,807

4.10.1 Total budget of the HEI

| Name of the HEI unit | Total budget in thous. CZK/EUR | Percentage of public funding in the Czech Republic | Share of public funding from abroad in % | Percentage of funding from other sources |
|--|--------------------------------|--|--|--|
| Faculty of chemistry and technology | 2 001 468 / 78 953 | 91,13 % | 3,21 % | 5,66 % |
| Faculty of Enviromental technology | 572 042 / 22 566 | 84,87 % | 5,21 % | 9,93 % |
| Faculty of food and biochemical technology | 1 264 122 / 49 867 | 92,36 % | 2,75 % | 4,89 % |
| Faculty of Chemical Engineeing | 1 161 678 / 45 826 | 93,87 % | 3,05 % | 3,08 % |
| Technoparc Kralupy | 192 907 / 7610 | 83,65 % | 8,86 % | 7,49 % |
| Central University Departments | 26 436 / 1043 | 96,69 % | 0,52 % | 2,79 % |

4.10.2 Share [%] of total costs/outputs by type of R&D&I paid from public and non-public sources

| | 2020 | 2021 | 2022 | 2023 | 2024 | Total |
|---|------------|------------|------------|------------|------------|------------|
| Basic research | 73 % | 76 % | 77 % | 79 % | 79 % | x |
| Applied Research | 19 % | 17 % | 16 % | 15 % | 15 % | x |
| Experimental development and innovation | 8 % | 7 % | 7 % | 6 % | 6 % | x |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

Note: For definitions see Definition of Terms in Methodology HEI2025+.

4.10.3 Projects supported by a foreign provider

| In the role of beneficiary | | | | | | | |
|------------------------------------|------------------------|--------------|--------------------------------|--------------------|--------------------|---------------------|---------------------|
| Provider / Investor | Programme/Grant Scheme | Project name | Support (in thousands CZK/EUR) | | | | |
| | | | 2020 | 2021 | 2022 | 2023 | 2024 |
| European comission | | TOTAL | 8360 / 330 | 9734 / 384 | 13755 / 543 | 31928 / 1260 | 55016 / 2171 |
| Other foreign | | TOTAL | 1040 / 41 | 2200 / 87 | 1681 / 66 | 2838 / 112 | 1797 / 71 |
| Total | | | 9401 / 371 | 11938 / 471 | 15436 / 609 | 34767 / 1371 | 56813 / 2242 |
| In the role of another participant | | | | | | | |
| Provider / Investor | Programme/Grant Scheme | Project name | Support (in thousands CZK/EUR) | | | | |
| | | | 2020 | 2021 | 2022 | 2023 | 2024 |
| European comission | | TOTAL | 16147 / 637 | 10959 / 432 | 18659 / 736 | 15553 / 614 | 19785 / 780 |
| Other foreign | | TOTAL | 5883 / 232 | 2757 / 109 | 6170 / 243 | 4718 / 186 | 2801 / 111 |
| Total | | | 24040 / 869 | 13716 / 541 | 24829 / 980 | 20271 / 799 | 22586 / 891 |

4.10.4 Projects supported by the Czech provider

| In the role of beneficiary | | | | | | | |
|---|------------------------|--------------|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Provider / Investor | Programme/Grant Scheme | Project name | Support (in thousands CZK/EUR) | | | | |
| | | | 2020 | 2021 | 2022 | 2023 | 2024 |
| Experintia Foundation | | TOTAL | 0 / 0 | 0 / 0 | 4408 / 174 | 2105 / 83 | 0 / 0 |
| GACR | | TOTAL | 160998 / 6351 | 155803 / 6146 | 166358 / 6562 | 176123 / 6948 | 178038 / 7023 |
| Government office | | TOTAL | 868 / 34 | 851 / 34 | 800 / 32 | 888 / 35 | 906 / 36 |
| Ministry of Agriculture | | TOTAL | 7298 / 288 | 7321 / 289 | 10293 / 406 | 13012 / 513 | 16858 / 665 |
| Ministry of culture | | TOTAL | 9042 / 357 | 8594 / 339 | 7641 / 301 | 5528 / 218 | 5111 / 202 |
| Ministry of Education, Youth and Sports | | TOTAL | 37810 / 1492 | 109113 / 4303 | 41094 / 1621 | 31232 / 1232 | 39824 / 1571 |
| Ministry of Foreign Affairs | | TOTAL | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 1483 / 59 |
| Ministry of Health | | TOTAL | 0 / 0 | 3475 / 137 | 8174 / 322 | 9555 / 377 | 9368 / 370 |
| Ministry of Industry and Trade | | TOTAL | 653 / 26 | 1044 / 41 | 1293 / 51 | 0 / 0 | 0 / 0 |
| Ministry of the Interior | | TOTAL | 19605 / 773 | 61252 / 2416 | 41212 / 1626 | 41366 / 1632 | 45622 / 1800 |
| TACR | | TOTAL | 59867 / 2362 | 64855 / 2558 | 63786 / 2516 | 50019 / 1973 | 73040 / 2881 |
| TOTAL | | | 296142 / 11682 | 412309 / 16265 | 345059 / 13612 | 329828 / 13011 | 370251 / 14606 |
| In the role of another participant | | | | | | | |
| Provider / Investor | Programme/Grant Scheme | Project name | Support (in thousands CZK/EUR) | | | | |
| | | | 2020 | 2021 | 2022 | 2023 | 2024 |
| GACR | | TOTAL | 27722 / 1094 | 36224 / 1429 | 37248 / 1469 | 44240 / 1745 | 35592 / 1404 |
| Ministry of Agriculture | | TOTAL | 8217 / 324 | 9300 / 367 | 8538 / 337 | 7640 / 301 | 3082 / 122 |
| Ministry of culture | | TOTAL | 4658 / 184 | 2215 / 87 | 2215 / 87 | 5094 / 201 | 5676 / 224 |
| Ministry of Education, Youth and Sports | | TOTAL | 11891 / 469 | 11593 / 457 | 15488 / 611 | 58032 / 2289 | 41572 / 1640 |
| Ministry of Health | | TOTAL | 6117 / 241 | 8460 / 334 | 8695 / 343 | 7220 / 285 | 3992 / 157 |
| Ministry of Industry and Trade | | TOTAL | 30320 / 1196 | 19647 / 775 | 14402 / 568 | 12959 / 511 | 1338 / 53 |
| Ministry of the Interior | | TOTAL | 2965 / 117 | 3238 / 128 | 4239 / 167 | 5912 / 233 | 7372 / 291 |
| TACR | | TOTAL | 72290 / 2852 | 77830 / 3070 | 71898 / 2836 | 101828 / 4017 | 107387 / 4236 |
| TOTAL | | | 164180 / 6477 | 168506 / 6447 | 162723 / 6419 | 242925 / 9583 | 206010 / 8127 |

Note: Please summary list GA CR, TA CR and other departmental projects. For co-sponsor projects, please indicate the financial volumes for the HEI. Projects financed from EU structural funds and focused exclusively on R&D&I (e.g. OP JAK, OP TAK, NPO) and projects financed from regional sources focused exclusively on R&D&I list individually. For co-sponsoring projects, please indicate the financial volumes for the evaluated HEI only.

4.10.5 Projects supported from non-public sources

| In the role of beneficiary | | | | | | |
|--------------------------------------|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Provider / Investor | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2020 | 2021 | 2022 | 2023 | 2024 |
| SANDOZ GMBH | Collaborative research project | 0 / 0 | 1368 | 554 | 47 | 180 |
| BUCHI LABORTECHNIK | Collaborative research project | 0 / 0 | 0 / 0 | 0 / 0 | 0 / 0 | 921 / 36 |
| SKODA AUTO A.S. | Development of a simulation model | 0 / 0 | 40 / 2 | 247 / 10 | 245 / 10 | 260 / 10 |
| SYNTHOS S.A. | Collaborative research project | 1335 / 53 | 2670 / 105 | 4434 / 175 | 0 / 0 | 0 / 0 |
| ZENTIVA, K.S. | Analysis of the chemical composition of samples | 909 / 36 | 83 / 3 | 0 / 0 | 544 / 21 | 540 / 21 |
| BORSODCHEM MCHZ, S.R | Collaborative research project | 650/26 | 500/20 | 762/30 | 750/30 | 500/2 0 |
| TEVA CZECH INDUSTRIE QC TAPI | Collaborative research project | 775/31 | 670/26 | 420/17 | 450/18 | 0/0 |
| SPOLANA S.R.O. | Collaborative research project | 543/21 | 450/18 | 500/20 | 600/24 | 600/2 4 |
| BOEHRINGER INGELHEIM | Collaborative research project | 2436 / 96 | 4451 / 176 | 3968 / 157 | 4117 / 162 | 1965 / 78 |
| DPI The Polymer Research Platform | Collaborative research project | 682 / 27 | 2096 / 83 | 2473 / 98 | 2297 / 91 | 838 / 33 |
| KOSTELECKÉ UZENINY A.S. | Food technology experiments | 1000/39 | 1000/39 | 1000/39 | 0/0 | 0/0 |
| SUSPRO S.R.O. | Development of a technological scheme of the separation device, laboratory test | 0/0 | 400/16 | 0/0 | 0/0 | 989/3 9 |
| UJP PRAHA A.S. | Evaluation of corrosion transitions of alloys | 150/6 | 200/8 | 150/6 | 200/8 | 200/8 |
| Other projects in total | | 66416 | 78229 | 72872 | 76895 | 71727 |
| Total | | 74 896 /2 955 | 90 706 /3 578 | 86 826 /3 425 | 81 981 /3 234 | 78540 /3 098 |
| In the role of another participant | | | | | | |
| Provider / Investor | Project name | Support (in thousands CZK/EUR) | | | | |
| | | 2020 | 2021 | 2022 | 2023 | 2024 |
| VOESTALPINE STAHL | Collaborative research project | 0/0 | 841 / 33 | 841 / 33 | 841 / 33 | 841 / 33 |
| Total | | 0/0 | 841 / 33 | 841 / 33 | 841 / 33 | 841 / 33 |

Note: Indicate, for example, sponsorship donations, resources generated from other own economic activities, foreign subsidy programmes of private entities.

4.11 Rules for the use of institutional support for the LCDRO

The HEI will describe the strategy and rules for the use of institutional support for the LCDRO in the management of institutionally supported research activities (e.g., prioritisation of research topics by the HEI according to individual needs, internal grant agencies, incentive tools, support for excellent science) and the method for distribution of institutional support to individual departments/research teams for the period of 2020–2024. The impact on the management of institutionally supported research activities will be described by the HEI using specific examples (e.g. distribution of institutional support in the period of 2020–2024 depending on the evaluation results, examples of supported excellent science projects, etc.).

Maximum 500 words plus 200 words for each example given (max. five examples).

Self-assessment:

The institutional support of LCDRO is, by its majority, divided to the faculties by the agreement of deans with the rector. Faculties then apply their own rules. Generally, significant part of this support is distributed to the departments based on the research outcomes. Departments can negotiate extra funding in order to support new research area or highly socially relevant areas. In addition, this financial support is used to co-finance the excellent research projects, where co-financing is required by the funding agency. University also operates Internal grant agency, supporting research grants of PhD students, pedagogical grants (innovation in education) and social grants (students cultural and sport activities). The particular internal grant types are financed by different financial resources.

As an example of the use of LCDRO support, the extraordinary support was provided to the Department of Chemical Technology of Monuments Conservation. The conservation science usually does not generate papers in high-impact journals, but the social relevance of the research is very high. In recent years the support led to a book František Josef Šlik and the Czech Baroque landscape: the life of a nobleman in the East Bohemian countryside (in Czech), which was highly positively evaluated in M1 module.

Moreover, the LCDRO is used to co-finance the excellent research projects, such as OP JAK “excellent research”. In this case, the MEYS, as the funding body, defined numbers of projects, for which the universities can apply. By the strategic decision of the university, the application of a project Energy conversion and storage (ECO&Stor) was prepared and submitted. The project was approved and now its one of the flagships of the university in high quality research.

On June 1, 2022, the new National Institute of Virology and Bacteriology (NIVB) started its activities. Its primary task is basic and clinically oriented research on viruses and pathogenic bacteria that cause diseases with a significant health and economic impact. The Institute consists of research groups from four institutes of the Academy of Sciences and the same number of Czech universities, including the University of Chemistry and Technology in Prague, which is already represented on the coordination board by Professor Michaela Rumlová. The new institute with a current budget of almost 1.5 billion CZK was created thanks to the financial support of the EXCELES program of MEYS and co-financed using LCDRO.

The ranks of researchers at the University of Chemistry and Technology, Prague, have been expanded with the hiring of top international expert Andrea Brancale from Cardiff University. The internationally recognized scientist was selected after a rigorous interview process for the "Chair Medicinal Chemistry" position. As Chair, Brancale will build a new UCT Prague research group focused on excellence and the production of high-quality scientific outputs in the field of medicinal chemistry. The new, prestigious position was created for an initial period of five years, funded by IOCB Tech in cooperation with the Institute of Organic Chemistry and Biochemistry of the Academy

of Sciences of the Czech Republic (IOCB Prague). The activities of this excellent research team are o-financed with the use of LCDRO.

NATIONAL AND INTERNATIONAL COOPERATION

4.12 Important collaborations in R&D&I

The HEI will describe specific cases of R&D&I collaboration at the national level (maximum five examples) and the international level (maximum five examples), including examples of concrete results and impacts in the field of R&D&I beneficial for the HEI during the period of 2020–2024.

Maximum 300 words per example.

Self-assessment:

- **BioMates** ([LCE-08-2016-2017](#))

VSCHT Praha – Technopark Kralupy and Ranido (SME Kralupy), together with another 7 European partners, cooperate on BioMates project. BioMates is an EU-funded project focused on creating a sustainable bio-oil production process to replace crude oil in refineries. The project recently achieved a significant milestone, establishing a validation-scale production process. After producing 1000 kg of bio-oil last year, the technology was tested in validation facilities in Sweden and Greece, meeting Technology Readiness Level (TRL) 5, which means it was validated in an industrially relevant environment. The project has demonstrated successful bio-oil production and post-treatment, with a stable product suitable for storage and shipping. Additionally, BioMates' mild hydrotreatment process, developed with a custom catalyst by Ranido and a hydrogen compression system by HyET Hydrogen, produces 10 litres of BioMates per day. The final phase of the project aims to validate BioMates as a co-processing refinery feedstock. By blending BioMates with fossil inputs, the process will produce approximately 1,000 liters of transportation fuels. The final diesel cut is expected to meet the EN 590 specification. EBioMates brings together academic, industrial, and SME partners, aiming to reduce Europe's dependence on fossil fuel imports and secure energy supply. It also supports the European biofuels sector, with innovative technology and policy frameworks discussed during a 2021 workshop at the European Biomass Conference.

- **ORBIS** ([MSCA-RISE-2017](#))

When developing a new chemical entity for a medicinal product, only one out of approximately 10,000 molecules enters the market as an approved drug. The societal demand for more effective, affordable and sustainable medicines has created a challenge of supply within the pharmaceutical industry. To address this gap, ORBIS proposed that the time for the medicinal product to reach the patients might be reduced by improving early stage R&D productivity. The overarching objective and outcome of ORBIS was to form an international and intersectoral academic and industrial network to address the challenge of medicinal product development. The close cooperation between the project partners, synergy and knowledge transfer between the academic and industrial sectors, has created a stimulating environment for employees and PhD students to advance their individual career and transferrable skills during research secondments.

- **WIDER UPTAKE OF WATER-SMART SOLUTIONS** ([CE-SC5-04-2019](#))

The results of the experiments conducted by the research team of the UCT Prague confirmed that the effluent from the Prague Wastewater Treatment Plant can be further processed to meet the requirements for the quality of reclaimed water according to Regulation EU 2020/741. The chemical quality of the recycled water met quality class I and the biological quality met class I-II

according to Regulation 220/741. The reclaimed water did not show any negative effect on the growth of the tested plants and soil. The results have contributed to the better acceptance of reclaimed water. The results of the project were used in the innovation of teaching at the UCT in this area and formed the core of a successfully defended doctoral dissertation.

- **FoodSafety4EU (Multi-stakeholder platform for food safety in Europe)**

FoodSafety4EU (<https://foodsafetyplatform.eu/>) was a collaborative action to support the European Commission (EC) in shaping the Food Safety System (FSS) of the future, and to catalyse its transition through collaboration and engagement at different levels (global and local). The overall goal of the project was to design, develop and release a multi-stakeholder platform and establish a long term Science-Policy-Society interface: a collaborative space where citizens, scientists, companies, EC, EFSA, and Food Safety Authorities, will co-design new schemes to advance the FSS from a reactive system to an interactive one. Platform users are enabled now to access efficiently resources and data, share and exchange scientific knowledge and contributions, interact and network, create new partnerships and joint activities. With the overall ambition of being the basis for a Knowledge Centre for Food Safety in Europe supporting the transformation towards a safe and sustainable food systems, the project was focused on three impact areas by developing and providing roadmaps and strategies for: (a) Food Safety System integration; (b) Co-creation and alignment of future research programs, at national and EU level; (c) Enhancement for public confidence through transparency and access to the integrated knowledge. The platform was built through a dynamic participatory process, based on a multi-level layers of connection and interaction among the platform users. This process was supported by 4 Food Safety Operational Social Labs (FSOLabs) to feed the participatory process by involving multi-stakeholder expert groups at Hub level (UCT Prague was leader of East Hub), thus representing different EU geographical areas. UCT Prague was integrated into all FSOLabs and contributed to these results: Strategic Research and Innovation Agenda, NET MAP Analysis, Report on Funding for Food Safety including guidelines for the alignment of National research agendas, New formats and models for risk communication to target publics. The top layer of the participatory process is represented by the EU Food Safety Forum that was launched at the project end and continues as a permanent science-policy-society interface with fixed and ad-hoc appointments where stakeholders meet, present, co-create outputs, to continue the work.

- **Cooperation between UCT Prague and Taiwan**

UCT Prague has long been cooperating with leading Taiwanese universities and research institutions in the field of science and research. This cooperation includes joint scientific projects as well as student exchanges and internships. In 2019, the rector of the UCT Prague visited Taiwan, where he signed cooperation agreements with several major institutions, including National Chung Hsing University and National Chiao Tung University. These agreements have enabled the expansion of cooperation in the areas of biomedical research, circular economy and supramolecular chemistry.

In addition, UCT Prague established contacts with the Industrial Technology Research Institute and Academia Sinica, which contributed to further deepening scientific cooperation between the Czech Republic and Taiwan. These activities enabled students and scientists from UCT Prague to gain valuable experience and knowledge in international projects and internships.

- **The Pharmaceutical Applied Research Center (The Parc) <https://www.theparc.eu/>**

The PARC is a unique research platform that bridges the fields of chemistry, pharmaceutical technology, biopharmaceutics and clinical research. It aims to create an environment for talented students who will be able to address current and future challenges in pharmaceutical research. Masters and PhD students within The PARC base their research on real industry needs

and work under the joint guidance of academic leaders and industry scientists. This provides them with the theoretical knowledge and practical skills for their future professional careers in both academic and industrial pharmaceutical research and development. UCT Prague is one of the key academic partners and leaders within The PARC. The PARC was founded on the basis of the ORBIS project described above. The collaboration between UCT Prague and The PARC enables students and scientists to gain experience in fields such as solid-state chemistry, pharmaceutical technology, biopharmaceutics and clinical research. In addition, this collaboration includes a mentoring programme in which experienced scientists from academia and industry supervise students, share their expertise and provide support in day-to-day activities. This form of collaboration has yielded excellent results, including the launch of several pharmaceuticals on the market and the establishment of a start-up company.

- **Prague.bio Cluster** (<https://www.prague.bio/>)

UCT Prague is a founding member of the Prague.bio cluster, which aims to become a moderator of the overall development of biotechnology in the Czech Republic, to represent the Czech biotechnology industry abroad, to contribute to greater drug independence of the Czech Republic and to support the development of drugs that may one day change the fight against certain diseases worldwide. Other founding members are [IOCB Tech](#), [I&I Prague](#), [CAS Institute of Biotechnology](#), [CAS Institute of Microbiology](#) and [CAS Institute of Molecular Genetics](#). Important partners of Prague.bio are Zentiva, the largest pharmaceutical company in the Czech Republic, and many other companies and institutes in the field of BioTech.

Main goals of Prague.bio are:

- to connect all the parts of the local biotech scene (business, academia, government),
- to support the visibility of local biotech sector and to connect it with international partners,
- to help with tech transfer and commercial use of R&D results,
- to bring the best practices, enhance expertise and opportunities.

- **Cooperation between UCT Prague and [Pražské vodovody a kanalizace a.s.](#) (Prague Waterworks and Sewerage Company)**

UCT Prague has long worked closely with the Prague Waterworks and Sewerage Company (PVK) on several important projects focused on wastewater analysis and recovery. One of the key results of this collaboration is the development of a unique [method for the detection of SARS-CoV-2 virus in wastewater](#), which allows the detection of the disease up to 14 days earlier than traditional clinical tests. This method is based on the determination of the RNA content of the virus in wastewater, and people often start shedding the virus in their stool several days before symptoms appear. In addition, UCT and PVK were monitoring wastewater at selected primary and kindergarten schools in Prague to obtain information on the spread of the disease in these facilities and to minimise the need for blanket testing.

Another area of cooperation is a project focused on the safe and cost-effective use of recycled municipal wastewater for the greening of urbanised areas, which is being carried out in cooperation with the Central Wastewater Treatment Plant in Prague. This project demonstrates the possibilities of replacing drinking water with recycled water for irrigation, which contributes to sustainable water resource management. These joint initiatives of the UCT and PVK not only strengthen scientific research in the field of water management but also provide practical solutions to current challenges related to public health and sustainable use of water resources.

STUDIES

4.13 Doctoral studies

The HEI will briefly describe the organisation of the doctoral studies (if there are any doctoral study programmes³⁷). HEI will comment on:

- Structure and organization of studies.
- A system of cooperation between PhD students and their supervisors.
- Basic statistics (including drop-out rate, student workload, etc.).
- Information on promotion and recruitment schemes.
- Cooperation within doctoral studies (e.g., Czech Academy of Sciences, application sphere, building open study programmes for foreign nationals and creating international networks of study programmes, "joint degree", "cotutelle", etc.).
- Student care system (e.g. counselling, wellbeing care, career guidance).
- A system for tracking the future careers of graduates³⁸.
- Other relevant data, such as the existence of a doctoral school, basic soft skills courses, etc. at the discretion of the HEI.

The HEI shall support this with appropriate examples (e.g. a model example of doctoral student cooperation with their supervisor, statistics on collaboration within doctoral studies, specific examples within doctoral studies, statistics on the use of student care systems, etc.).

Maximum 300 words per point.

Self-assessment:

- **Structure and organization of studies**

Doctoral Study Programmes (**DSP**) at UCT Prague are designed to develop independent scientific and creative research skills. These programmes, available as full-time or combined studies, have a standard duration of study (**SDS**) of four years and can be extended to a maximum of seven years. Full-time students in the Czech programme receive a scholarship throughout the entire SDS. Doctoral students are obliged to take exams in four subjects, deliver scientific presentation in English, engage in teaching, undertake an internship abroad, pass the State Doctoral Exam, publish scientific articles (the number requirements are regulated by each PhD Study Board), and prepare and defend a dissertation. Doctoral students are also encouraged to apply for student research projects from an Internal Grant Agency. Although we have a system that monitors the fulfilment of these obligations (with the possibility of reducing stipend for non-compliance), the on-time graduation rate (within 4 +1 years) is 16%, with most students completing their studies in the sixth or seventh year, and the overall graduation rate is just around 50%).

To improve efficiency, we are preparing several measures for implementation. A forthcoming amendment to the Higher Education Act, effective from September 2025, will guarantee a minimal income for doctoral students throughout the SDS. This change, combined with the requirement for supervisors to co-finance, is expected to enhance motivation and reduce the need for students to seek external income sources. The amendment will also allow enable improvements in the DSP, such as replacement of the exams with two colloquia for more effective monitoring of dissertation progress and transitioning from the current method of graduation (state doctoral examination and dissertation defence) to a dissertation defence with a professional debate.

³⁷ If the HEI does not organise any doctoral programme, it will explicitly state this information in the self-evaluation report.

³⁸ The HEI will list the top five highest ranked graduates in academia, the private sector, and public administration over the past five years.

These measures, along with the introduction of a Doctoral School for personalized support, aim to shorten study duration, increase success rates, and improve the overall quality of doctoral training. These improvements will be fully incorporated in the new accreditation process scheduled for 2028.

- **A system of cooperation between PhD students and their supervisors**

At the beginning of the DSP, each student collaborates with supervisor to develop an **Individual Study Plan (ISP)**, which clearly outlines obligations and timelines. To facilitate the adjustment of new doctoral students, we have introduced an onboarding process using a “**adaptation plan**” tool, which emphasizes close collaboration between student and supervisor. During this process, they work together to address key areas such as study requirements, professional guidance, teamwork and effective communication. These regular meetings help clarify mutual expectations and track progress, while building a supportive and constructive relationship. To further guide students on their journey from enrolment to thesis defense, we provide a “**Survival Guide**” leaflet that highlights 15 key points on where to seek help and what to expect during the PhD. In addition, to enhance the quality and interdisciplinarity of supervision, a broader research team, consisting of a specialist supervisor or consultant, is often engaged in mentoring the doctoral student. Any problems or discrepancies are promptly resolved through the PhD Office, PhD Study Board, special committees or via the Ombudsperson, thereby preventing conflicts and delays.

Since 2024, we have also organized specialized **Supervision Courses** aimed at providing supervisors with modern methods of guidance, communication, motivation, and strategic career planning for doctoral students. These courses have already been completed by more than fifty supervisors out of 750).

Furthermore, the establishment of a **Supervisor Standard**, which includes recommendations, requirements and evaluation criteria, ensures the ongoing quality and effectiveness of doctoral supervision. By monitoring the collaboration between doctoral students and supervisors through regular colloquia and an innovative evaluation system, we aim to increase doctoral student satisfaction and ultimately improve the graduation rate.

- **Basic statistics (including drop-out rate, student workload, etc.).**

In 2023, UCT Prague had 834 doctoral students (397 women and 434 men) enrolled in 26 newly accredited and 15 terminating DSPs. This represents approximately 19% of the university’s total student numbers of 4,350. This high proportion gives UCT Prague the highest ratio of doctoral students to undergraduates in the Czech Republic. Of these doctoral students, 195 were international students studying in either Czech (27) or English (6) DSPs.

The numbers of doctoral students enrolled, dropped out and graduated have fluctuated in recent years, probably due to the disruption caused by the COVID-19 pandemic. In particular, the dropout rate in the first year, which is usually between 13% and 17%, rose sharply to 27% in 2023, likely as a result of limited access to laboratories, interruption of research activities and personal problems in previous pandemic years. By 2024, however, enrolment had reached 165 students, which is in line with pre-pandemic trends. The overall completion rate monitored since 2012 is around 50%, while the number of students completing their dissertation in the standard time of study (within 4+1 years) is approximately 16%. Dissertation completion in the SDS+1 for students enrolled after 2018 is also affected by the COVID-19 pandemic: for example, among those enrolled in 2019 (158), 15% (23 students) completed their SDS within 4+1 years, another 15% (24 students) have completed it to the current date (February 2025), while 56 students have dropped out and the remaining students (55) are still studying ([graphs 1](#), [graphs 2](#)). We expect a similar completion rate for the cohorts enrolled in 2020 to 2022. We expect improvement of

completion rates (within SDS+1 and in total) as a result of the measures we prepare for implementation from 2028. In terms of international internships ([graph 3](#), [graph 4](#)), the rise from 16 to 66 participants in 2021/2022 reflects better monitoring. The subsequent increase to 164 in 2022/2023 was driven by catch-up demand after COVID-19 restrictions. This number then stabilised at 117 in 2023/2024, with many of these internships lasting over a month, indicating a strong commitment to extended research stays. In 2023/2024 the average pedagogical workload for doctoral students in full-time and combined form of study was 73 and 88 hours, respectively ([graph 5](#), [graph 6](#)).

- **Promotion of Doctoral Studies at UCT**

The promotion of doctoral studies at UCT is specifically targeted at master's students, both within the university and among applicants from other organizations. The majority of applicants for DSP are continuing students from UCT master's programs, who become involved in research activities during their master's studies, naturally preparing them for doctoral studies. One of the main tools for broad promotion of doctoral studies is a dedicated website for applicants ([phd.vscht.cz](#)), which provides comprehensive information about available doctoral programs, admission requirements, funding opportunities, and experiences of current doctoral students. This website also offers an overview of research areas within each doctoral program, a list of newly announced dissertation topics, and direct contact information about supervisors, making communication between applicants and potential dissertation advisors easier.

The promotion also takes place through a seminar organized by the PhD Office, "**Freshman at the Doctorate**," where students receive basic information about doctoral studies at UCT. A similar type of recruitment and information seminar is held at individual faculties. Another key element in promoting doctoral studies is advertisement in a journal focused on chemical research **Chemical Letters**, which allows UCT to reach a broader scientific audience, including students and researchers from other institutions. For international students, DSP promotion is carried out through the [phdportal.com](#) and **LinkedIn** platform. In addition, targeted admissions are also conducted for new dissertation topics funded by external grant sources. These positions are advertised individually by the respective supervisor on platforms such as **ResearchGate**, [jobs.cz](#), **LinkedIn** or **Euraxess**, depending on the focus of the specific project.

In the future, we plan to strengthen the promotion of DSP through a more active presence on social media and to increase the involvement of current doctoral students in recruitment activities. The long-term goal is not only to ensure a stable number of enrolled doctoral students but also to increase the proportion of foreign students. Accordingly, based on the amendment to the Higher Education Act, international students will be entitled to the same income as their peers in Czech-taught programs—even when enrolled in English-taught study programs.

- **Collaboration in Doctoral Studies at UCT**

Collaboration within doctoral studies at UCT is highly developed and includes partnerships with institutes of the Czech Academy of Sciences (CAS), both Czech and foreign universities and industrial partners. A key component is the implementation of joint DSP, the involvement of doctoral students in research at external training institutions, collaboration with industrial partners, and international cooperation through joint degree programs and *co-tutelle* studies based on individual *co-tutelle* agreements within accredited DSP.

UCT conducts 22 accredited doctoral programs in collaboration with the CAS (10+12) and other institutions (1). Since 2019, the total number of doctoral students at CAS institutes and other research institutions has ranged between 100 and 120 students, and in 2023, UCT collaborated with 14 CAS institutes. Another example of collaboration is the creation of joint DSP with other Czech universities, such as Conservation Sciences in Cultural Heritage Preservation, which UCT

runs with University of Pardubice, and Bioinformatics, with Czech Technical University. UCT doctoral students can study in **double-degree doctoral program (DD DSP)** based on framework agreements with foreign universities. A total of 8 DD DSPs were accredited in 2018 and 2019. These programs establish minimum requirements for a joint ISP and additional conditions for completing a doctorate. Doctoral studies can also be conducted under dual supervision based on individual inter-university agreements known as *co-tutelle*. In 2024, 9 doctoral students were enrolled in accredited DD DSPs, while 2 doctoral students were enrolled at UCT under an individual *co-tutelle* agreement.

UCT maintains active collaboration with many industrial partners ([Table 1](#)) who participate in research projects, provide funding for doctoral students, and facilitate the direct connection between research and industrial applications. Usually, more than 20 dissertation theses are being conducted every year in collaboration with industrial partners. A prime example of this integration is The PARC (Pharmaceutical Applied Research Center) – a research center bridging academia with the pharmaceutical industry, specifically Zentiva. Through this partnership, doctoral students can engage in applied research in pharmaceutical chemistry, drug development, and biotechnology

- **Student care system (e.g. counselling, wellbeing care, career guidance). Comprehensive Support for Doctoral Students at UCT**

UCT places great emphasis on comprehensive support for doctoral students, which includes mental well-being, academic advising, and career development. The care for doctoral students is systematically ensured through several interrelated services and activities aimed not only at facilitating the course of study but also at helping students manage both academic and personal challenges.

A key role is played by the PhD Office, which organizes regular PhD Open Office Hours. These monthly meetings offer doctoral students' opportunity to consult with the PhD Support team, where they can address study-related, administrative, and personal issues. If necessary, students are referred to other specialists, including psychological counselling or the Ombudsperson, who helps resolve more complex situations related to the academic environment, relationships between supervisors and doctoral students, or ethical concerns.

Another crucial component of doctoral student support is the Counselling and Career Center (PKC), which offers a wide range of services focused on personal and professional development. Students can take advantage of psychological counselling, career counselling sessions, or a mentoring program that connects doctoral students with professionals from both academia and the applied sector. PKC also organizes specialized workshops and courses focusing on stress management, focus techniques or emotional resilience.

UCT also implements a well-being program aimed at promoting the mental well-being of doctoral students. As part of this program, regular lectures and workshops are held on topics such as building resilience, time management, work-life balance, and effective communication. PhD students at UCT can take advantage of **Zkumavka**, a childcare service designed to help parents balance their studies and family life. Zkumavka offers a safe and stimulating environment for children, providing professional care while parents focus on their research and academic responsibilities. This service is a great support for doctoral students who need flexible childcare options during their studies.

- **Career Tracking of PhD Graduates at UCT Prague**

UCT systematically monitors the career outcomes of its PhD graduates through regular surveys and analytical research. One such study was the Report on Career Tracking of PhD Graduates, conducted in 2021 as part of the DocEnhance project, which focused on graduates from previous

years. The survey gathered responses from 124 participants (with a 31% response rate). For example, the results showed that the largest share of PhD graduates found employment in the private sector (33.3% women and 46.9% men), followed by research organizations (30.8% women and 32.4% men), universities (30.8% women and 18.4% men) and government organization (3.1% women and 1.1 % men) ([graph 7](#)). A particularly noteworthy finding is that 83% of PhD graduates secured employment within one month of graduation, demonstrating the high employability of UCT alumni ([graph 8](#)). The survey also examined skills acquired during doctoral studies. Graduates highlighted the development of critical thinking, analytical skills, and subject-specific expertise, which they consider essential in their professional careers. Some PhD graduates who entered the industrial sector reported gaps in project management, adaptability, and communication skills, indicating an opportunity for enhancing transferable skills training within doctoral education.

Systematic surveys of both master's and doctoral graduates are conducted in two- to five-year cycles. In 2025, for the first time, a new survey will be sent to PhD alumni seven years after graduation. Additionally, UCT is preparing to integrate its tracking system with the biannual graduate employment statistics database of the Ministry of Labor and Social Affairs (MPSV), enabling a more detailed analysis of alumni career trajectories. This integration is scheduled for implementation by the end of 2026. PhD graduates from UCT find employment across a broad range of institutions, including research organizations, academic institutions, technology and chemical companies, public sector agencies, and research institutes. The list of some notable alumni is shown in [Table 2](#).

This diverse list of alumni career paths shows the wide range of opportunities available to PhD graduates from UCT—spanning academic research, leading technology companies, and industry applications. The university's open and flexible educational strategy allows graduates to develop key competencies essential for careers not only in the Czech Republic but also in international environments.

- **Other relevant data, such as the existence of a doctoral school, basic soft skills courses, etc. at the discretion of the HEI.**

UCT has been continuously developing and modernizing its doctoral study programs, aiming to increase study efficiency while providing a structured system of individual support and professional development. In February 2024, a new position of Vice-Rector for Doctoral Studies was established, along with the creation of the PhD Office which coordinates strategic reforms, doctoral student support, and DSP modernization.

In parallel with its scientific focus, UCT emphasizes the development of transferable skills for doctoral students through specialized courses designed to enhance their professional and personal competencies. Key courses include Academic Culture, Data Stewardship, Leadership and Supervision, Effective Scientific Writing, How to submit project proposal, and other.

Additionally, UCT organizes an annual two-day summer doctoral school in cooperation with the National Technical Library (NTK), fostering international networking and knowledge exchange among PhD students.

UCT is also actively engaged in international initiatives and is a member of **EUA-CDE** (European University Association – Council for Doctoral Education) and the **PRIDE Network**, enabling the sharing of best international practices in doctoral education.

As part of the doctoral education modernization at UCT, the university is preparing to launch a Doctoral School implementing ResearchComp competencies as a framework, which will integrate all doctoral-related activities and create a unique academic environment that supports excellence. The implementation of these changes aims to shorten the duration of doctoral

studies, increase the success rate of graduates, and enhance the overall quality of doctoral education.

IMPLEMENTATION OF RECOMMENDATIONS

4.14 Implementation of the recommendations in Module 4

The HEI will briefly describe how it has implemented the recommendations for Module 4 from the previous evaluation period, if applicable.

Maximum 1000 words

Self-assessment:

The recommendations for Module 4 from the previous evaluation period are listed [here](#).

The mission, vision and strategic priorities of the university are listed in Strategic plan for years 2021-2025, containing also the previous recommendations. This year, the preparation of new strategic plan for the following period will be done and the results of this evaluation will be reflected.

The university established a Project centre in 2021 in order to improve the project support at the university. The capacity of technology transfer team was increased from 1 to 3 FTE. The activities now include also proof-of-concept projects in the frame of TACR Sigma frame and systematic support for establishment of spin-offs and startups. Currently, we are considering full separation of Technology Transfer Office and employing of one specialized lawyer (currently we use university's general ones, which are very busy). Regarding the support of research, data management team was established, containing the coordinator and data stewards. This team, together with the vice-rector for research and development, defines the open data strategy and also supports researches in setting-up the data management plans for their projects. The doctoral office, which was formerly a part of the Department of Research and Development, is now an independent body with widened activities. The mentioned situation about low scholarships for PhD students is currently being solved by a new law, which will guarantee them certain level of income, much higher than till now. The university will have to co-finance the income and the exact rules are currently defined.

UCT Prague is aware of the need to continuously invest to the research equipment. The funding opportunities are monitored by Project centre and the strategic projects are prepared. Central laboratories are still the priority, because centralization saves the cost and space and ensures quality of the results. The Board of Central laboratories now meets regularly to define the priorities in renewing of the equipment.

The HR Award was achieved the action plan is now implemented. The recruitment policy and other measures related to this were improved. The evaluation of individuals is allowed due to the Employee's profile, where all activities (publications, grant applications, teaching and others) are listed. The rules for mentioned sabbaticals exist since 2017. In the evaluation period, prof. Štěpánek spent his sabbatical in year 2021 at Rutgers University in New Jersey, USA. The stay was financed by Fullbright scholarship.

Gender balance related activities are still in progress, comprising specific seminars and workshops, like Global Women's Breakfast (<https://fchi.vscht.cz/gwb>) or Julie Hamáčková Award (<https://eige.europa.eu/gender-mainstreaming/toolkits/gear/julie-hamackova-award-university-chemistry-and-technology-uct-cz>) to support the integration of gender aspects into research and pedagogical work. This award is unique in our country.

International Advisory Board (IAB) was established, containing mainly former members of IEP, which evaluated UCT Prague in 2020. IAB helps us to define the strategic documents and to consult strategic decisions of the university.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 4

| Document name | No. criteria | Location (link in HTML) |
|--|--------------|---|
| List of complete scientific projects | 4.10 | https://www.vscht.cz/files/uzel/84537/0001~88ksLIHIT1Nlzs8tyEktSVUoTs5MzSvJTMtMVigoys9KTS4pVgAA.pdf?redirected |
| Mobility of academic and research staff | 4.8 | https://www.vscht.cz/files/uzel/84537/0002~881PyszJLKIUyE9TSExOTEnNzUxWSMxLUShKLU5NLErOUCguSUxLAWA.pdf?redirected |
| Tab.1 Partners for Master and Doctoral Theses | 4.13 | https://www.vscht.cz/files/uzel/84537/0012~COIMyklVMFQISCwqyUstKlZlly9S8E0sLkktUkjMS1FwyU8uyS9KzFEIyUgtTiOGAA.pdf?redirected |
| Tab.2 UCT Prague selected PHD alumni | 4.13 | https://www.vscht.cz/files/uzel/84537/0013~COIMyklVMNJTCHUOUQgoSkwvTVUoTs1JTS5JTVEI8HBRSMwpzc3LBAA.pdf?redirected |
| Graph 1: Yearly overview of doctoral students at UCT Prague (2012-2024) | 4.13 | https://www.vscht.cz/files/uzel/84537/0004~cy9KLMhQMFSITE0syglUyC9LLSrLTC1XyE9TSMIPLskvSsxRKC4pTUUnNKylWSCxRCHUOUQgoSkwvTQUA.pdf?redirected |
| Graph 2 Graduation Rates: Overall vs. On-Time | 4.13 | https://www.vscht.cz/files/uzel/84537/0005~cy9KLMhQMFWL0pMKU0syczPUwhKLEktVvAvSy1KzMIRKcVWU DP0w3JzE0FAA.pdf?redirected |
| Graph 3: Number of Doctoral Students on an International Internship | 4.13 | https://www.vscht.cz/files/uzel/84537/0006~cy9KLMhQMFBwK81NSi1SyE9TcMIPLskvSsxRCC4pTUUnNKylWyM9TSMxT8MwrSS3KSyzJzM8DSk4xRmZBQA.pdf?redirected |
| Graph 4: Doctoral Students' International Internship Durations by Academic Year | 4.13 | https://www.vscht.cz/files/uzel/84537/0009~cy9KLMhQMFFwyU8uyS9KzFEILiINScOrKX7UMNMzryS1KC-xJDM_DygB4RVnZBYouJQWgUUvKioVHJMTU1JzM5MVIIMTiwA.pdf?redirected |
| Graph 5: Doctoral Students' Involvement in Pedagogical Activities in 2023/2024 | 4.13 | https://www.vscht.cz/files/uzel/84537/0010~cy9KLMhQMFWwyU8uyS9KzFEILiINScOrKT60RcEzryw_pyw1F8hVyMxTCEhNSUzPT89MBqpyTC7JLMssyUwtBskYGRgZxwMJEWa.pdf?redirected |
| Graph 6: Number of Doctoral Students Consulting Bachelor or Master Thesis in 2023/2024 | 4.13 | https://www.vscht.cz/files/uzel/84537/0008~DctBDkAwEEbhq_xHEMQBkFix4QKjSptUR2am99f231vEfoCBmzIPb2Ab8zsjlUSdiuXz6aYOGtJFvODkVzwiSsUrKRWlyN4jYqY0TztV-t.pdf?redirected |

| | | |
|---|------|---|
| Graph 7: Employment Sectors of UCT Prague PhD students | 4.13 | https://www.vscht.cz/files/uzel/84537/0011~cy9KLMhQMFDwzS3Iya_MTc0rUQhOTS7JLypWyE9TCHUOUQgoSkwvTVUIyHBKRC4pTQGqKAYA.pdf?redirected |
| Graph 8 Time taken by UCT Prague PhD graduates to find employment | 4.13 | https://www.vscht.cz/files/uzel/84537/0007~BcHBDYAgDAXQVf4Y3jXxygEHqKECwRZSy4Htfe80GgUbYhWGU2PFvXDTEcEoT0YoB7JRmuT8wTueqgks4-1LWP0H.pdf?redirected |
| Recommendation from IEP UCT 2020 | 4.14 | https://www.vscht.cz/files/uzel/84537/0003~C0pNzs_NTc1LSSzJzM9TyE9T8HQNUAh1DIewMjAyAAA.pdf?redirected |

MODULE 5 - STRATEGY AND POLICIES

5.1 Mission and vision of the evaluated institution in R&D&I

The HEI will briefly describe its mission and vision with emphasis on R&D&I in general and its R&D&I capacities in the implemented R&D&I fields³⁹ (Tables 5.1.1 and 5.1.2). In particular, the HEI's vision covers the following five-year period and must relate to the strategic objectives of the Provider, the National Policy on Research, Development, and Innovation of the Czech Republic 2021+, the Gender Equality Strategy 2021-2030, and other higher national and supranational strategic documents in the field of R&D&I (Table 5.1.3). The HEI shall complement the description with active references to its Strategic plan for the teaching, scholarly, scientific, research, development, artistic, and other creative activities of the higher education institution (regarding the results and recommendations from the previous evaluation period, if the evaluated HEI participated in it). The HEI shall describe how the vision and mission were implemented during the period of 2020–2024.

Maximum 2000 words.

Self-assessment:

UCT Prague builds its quality and reputation on a long tradition of teaching technical chemistry and food science in the Czech Republic and throughout Central Europe. Therefore, UCT Prague has long profiled itself as a distinctly transregional research technical university with high quality basic and applied research, meeting the requirements of social relevance, in a wide range of disciplines closely linked to the technical higher education provided.

The vision (aim) is to continuously enhance the unique brand of UCT Prague as a leading, relatively small, innovative and quality-oriented technical research university with a significant social impact within the Czech Republic and the entire Central European region. Reflecting European higher education and research standards as a necessary condition for maintaining and strengthening a high international reputation, the aim is to ensure:

1. **Stable research excellence:** the university focuses on the implementation of internationally competitive basic and applied research that delivers innovative solutions and contributes to the advancement of scientific knowledge in three main research pillars, which are fully aligned in meaning and content with all fundamental national R&D&I policies:
 - A. Health and Safety - excellent research in the areas of food safety and quality, the use of water as a strategic raw material, the development of advanced methodologies for forensic analysis and synthesis, testing and modelling the properties of bioactive compounds for medical applications or bioinformatics.

³⁹ For so-called R&D&I capacities, see Definition of Terms in Methodology HEI2025+.

- B. **Materials and Specialty Chemicals** - excellent chemical and materials research in the areas of advanced organic and inorganic materials, nanomaterials, functional materials and high value-added specialty chemicals to improve the quality of life of modern society with lower energy consumption and minimal negative environmental impact.
- C. **Energy efficiency** - excellent research focused on efficient and cost-effective technological processing of all forms of fossil carbon resources for their efficient chemical and energy use, including the development of advanced decarbonisation processes, as well as research on alternative energy sources, hydrogen technologies, fuel cells and progressive chemical forms of energy saving.
2. **Effective cooperation with industry, municipality and state administration:** active and mutually beneficial cooperation with industrial partners is crucial for the application of research results in practice, for the support of commercially successful technology transfer and also as a valuable source of financial resources for the university budget.
 3. **High international reputation:** the University aims to gain a high international reputation through publications in prestigious scientific journals, collaboration with leading foreign institutions and participation in prestigious international projects within Horizon Europe.
 4. **Sustainable funding of science and research:** maintaining a high share of funding from scientific research activities in the total budget of the University is crucial to ensure that research objectives are met in their full breadth, to support technical and technological innovation and, in general, to ensure the quality of the research and educational infrastructure of the demanding chemical disciplines (target: share of funding for R&D&I more than 50% of the University's operating budget).
 5. **High proportion of PhD students:** to keep a high proportion of PhD students is essential for the further development of the University's scientific potential and for ensuring the continuity of research activities.
 6. **Sufficiently motivated research staff:** fair and competitive salaries, professionalism and fairness in accordance with the HR Award principles, a career path enabling personal development, as well as investment in the professional growth of staff are essential to attract and retain top experts.

The mission of UCT Prague is to be a university open to social demand for education and knowledge, fair in relations with partners and the public, internationally competitive and capable of reflecting the challenges of sustainable development in the fields of chemistry, chemical technology, chemical engineering, materials engineering, biochemistry, biotechnology, food science, energy management and the environment. An integral part of the mission of UCT Prague is the active promotion and popularization of technical and natural science disciplines including their latest trends to the public with a direct impact on the sustainable development of society and the future of the young generation.

The declared vision and mission of UCT Prague continuously builds on and further develops the goals and mission of the university stated in the self-assessment report for IEP 2020. It can be concluded that UCT Praha has been successful in fulfilling its vision over the past five-year period, as evidenced by:

- membership in the prestigious Association of Research Universities of the Czech Republic,
- a stable and balanced high ranking within research organisations at the national level according to the Methodology for Evaluating Research Organisations 2017+,
- receiving the HR Award,
- relevant setting of research priorities confirmed by the university's participation in 8 projects of the Programme Johannes Amos Comenius – Excellence in Research (financial subsidy of CZK 588 million received).

The International Advisory Board (IAB) of the University of Applied Sciences Prague helped to consult the basic vision and mission statement. In particular, it was recommended to deepen cooperation with industrial partners, to focus on knowledge transfer and to support doctoral studies as much as possible.

The goals for R&D&I are set realistically, with a sufficient degree of ambition and at the same time adequate to the expected financial, personnel, spatial and infrastructural possibilities of UCT Prague for the next five-year period.

5.1.1 R&D&I capacities of HEI in the year 2025

| Field of Research | FORD | FORD share [%] | Predominant type of research | Total share of field of reaserch [%] |
|---|---|----------------|-------------------------------------|--------------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | 0 | Zvolte položku. | 49 |
| | 1.2 Computer and information sciences | 1 | Balanced basic and applied research | |
| | 1.3 Physical sciences | 1 | Basic research | |
| | 1.4 Chemical sciences | 33 | Basic research | |
| | 1.5 Earth and related environmental sciences | 4 | Balanced basic and applied research | |
| | 1.6 Biological sciences | 9 | Basic research | |
| | 1.7 Other natural sciences | 1 | Basic research | |
| 2. Engineering and Technology | 2.1 Civil engineering | 0 | Zvolte položku. | 41 |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | 1 | Balanced basic and applied research | |
| | 2.3 Mechanical engineering | 0 | Zvolte položku. | |
| | 2.4 Chemical engineering | 11 | Balanced basic and applied research | |
| | 2.5 Materials engineering | 14 | Balanced basic and applied research | |
| | 2.6 Medical engineering | 0 | Zvolte položku. | |
| | 2.7 Environmental engineering | 5 | Applied research | |
| | 2.8 Environmental biotechnology | 2 | Applied research | |
| | 2.9 Industrial biotechnology | 1 | Applied research | |
| | 2.10 Nanotechnology | 2 | Balanced basic and applied research | |
| | 2.11 Other engineering and technologies | 5 | Balanced basic and applied research | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | 0 | Zvolte položku. | 4 |
| | 3.2 Clinical medicine | 0 | Zvolte položku. | |
| | 3.3 Health sciences | 4 | Balanced basic and applied research | |
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | 1 | Balanced basic and applied research | 3 |

| | | | | |
|----------------------------|--|-------|-------------------------------------|-------|
| | 4.2 Animal and Dairy science | 1 | Applied research | |
| | 4.3 Veterinary science | 0 | Zvolte položku. | |
| | 4.4 Other agricultural sciences | 1 | Balanced basic and applied research | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | 0 | Zvolte položku. | 1 |
| | 5.2 Economics and Business | 1 | Applied research | |
| | 5.3 Education | 0 | Zvolte položku. | |
| | 5.4 Sociology | 0 | Zvolte položku. | |
| | 5.5 Law | 0 | Zvolte položku. | |
| | 5.6 Political science | 0 | Zvolte položku. | |
| | 5.7 Social and economic geography | 0 | Zvolte položku. | |
| | 5.8 Media and communications | 0 | Zvolte položku. | |
| | 5.9 Other social sciences | 0 | Zvolte položku. | |
| 6. Humanities and the Arts | 6.1 History and Archaeology | 1 | Basic research | 2 |
| | 6.2 Languages and Literature | 0 | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | 0 | Zvolte položku. | |
| | 6.4 Arts (arts, history of arts, performing arts, music) | 1 | Basic research | |
| | 6.5 Other Humanities and the Arts | 0 | Zvolte položku. | |
| Total | | 100 % | - | 100 % |

5.1.2 Target R&D&I capacities of HEI for the next five-year period

| Field of Research | FORD | FORD share [%] | Predominant type of research | Total share of field of reaserch [%] |
|---|---|----------------|-------------------------------------|--------------------------------------|
| 1. Natural Sciences | 1.1 Mathematics | 0 | Zvolte položku. | 52 |
| | 1.2 Computer and information sciences | 1 | Balanced basic and applied research | |
| | 1.3 Physical sciences | 1 | Basic research | |
| | 1.4 Chemical sciences | 35 | Balanced basic and applied research | |
| | 1.5 Earth and related environmental sciences | 4 | Balanced basic and applied research | |
| | 1.6 Biological sciences | 11 | Basic research | |
| | 1.7 Other natural sciences | 0 | Basic research | |
| 2. Engineering and Technology | 2.1 Civil engineering | 0 | Zvolte položku. | 40 |
| | 2.2 Electrical engineering, Electronic engineering, Information engineering | 1 | Balanced basic and applied research | |
| | 2.3 Mechanical engineering | 0 | Zvolte položku. | |
| | 2.4 Chemical engineering | 11 | Balanced basic and applied research | |
| | 2.5 Materials engineering | 18 | Balanced basic and applied research | |
| | 2.6 Medical engineering | 0 | Zvolte položku. | |
| | 2.7 Environmental engineering | 5 | Applied research | |
| | 2.8 Environmental biotechnology | 2 | Applied research | |
| | 2.9 Industrial biotechnology | 1 | Applied research | |
| | 2.10 Nanotechnology | 2 | Balanced basic and applied research | |
| | 2.11 Other engineering and technologies | 0 | Balanced basic and applied research | |
| 3. Medical and Health Sciences | 3.1 Basic medicine | 0 | Zvolte položku. | 4 |
| | 3.2 Clinical medicine | 0 | Zvolte položku. | |
| | 3.3 Health sciences | 4 | Balanced basic and applied research | |
| 4. Agricultural and veterinary sciences | 4.1 Agriculture, Forestry, and Fisheries | 0 | Zvolte položku. | 0 |
| | 4.2 Animal and Dairy science | 0 | Zvolte položku. | |
| | 4.3 Veterinary science | 0 | Zvolte položku. | |
| | 4.4 Other agricultural sciences | 0 | Zvolte položku. | |
| 5. Social Sciences | 5.1 Psychology and cognitive sciences | 0 | Zvolte položku. | 2 |
| | 5.2 Economics and Business | 2 | Applied research | |
| | 5.3 Education | 0 | Zvolte položku. | |

| | | | | |
|----------------------------|--|-------|-----------------|-------|
| | 5.4 Sociology | 0 | Zvolte položku. | |
| | 5.5 Law | 0 | Zvolte položku. | |
| | 5.6 Political science | 0 | Zvolte položku. | |
| | 5.7 Social and economic geography | 0 | Zvolte položku. | |
| | 5.8 Media and communications | 0 | Zvolte položku. | |
| | 5.9 Other social sciences | 0 | Zvolte položku. | |
| 6. Humanities and the Arts | 6.1 History and Archaeology | 1 | Basic research | 2 |
| | 6.2 Languages and Literature | 0 | Zvolte položku. | |
| | 6.3 Philosophy, Ethics and Religion | 0 | Zvolte položku. | |
| | 6.4 Arts (arts, history of arts, performing arts, music) | 1 | Basic research | |
| | 6.5 Other Humanities and the Arts | 0 | Zvolte položku. | |
| Total | | 100 % | - | 100 % |

5.1.3 Relation to the strategic objectives of the provider and strategic documents in the field of R&D&I

| Strategic document | Follow-up |
|--|--|
| Strategic plan of the Ministry of Education and Science for the period from 2021 | <ul style="list-style-type: none"> • Priority Objective III. "Increase the efficiency and quality of doctoral studies"; operational objective A "Ensure sufficient financial conditions for quality studies for full-time PhD students"; operational objective B "Offer excellent candidates for doctoral studies above-standard motivational financial conditions"; operational objective C "Strengthen the quality, openness and internationalisation of doctoral studies"; operational objective D "Improve conditions for successful studies, including support for reconciliation of studies and family life, and strengthen the social integration of doctoral students" • Priority objective IV. "Strengthen strategic management and effective use of R&D capacities in HEIs"; operational objective A "Complete the comprehensive transformation of the environment and process settings"; operational objective B "Ensure the development of infrastructure services"; operational objective C "Promote excellence and societal relevance of research"; operational objective D "Develop international cooperation"; operational objective E "Cooperate with strategic partners in the implementation of R&D policy" • Priority Objective V "Build capacity for strategic management of HEIs"; Operational Objective B "Strengthen strategic management in HEIs"; Operational Objective D "Strengthen strategic management of human resources in HEIs" • Priority objective VI. "Reduce the administrative burden on university staff"; operational objective A "Simplify the transfer of information to public administration and improve the availability and circulation of information through continued digitisation of agendas"; operational objective C "Support the development of professional apparatuses providing support services for academics and the running of schools" |
| Strategy for the internationalisation of higher education for the period from 2021 | <ul style="list-style-type: none"> • Priority Objective I. "Developing global competences of students and staff of higher education institutions"; in particular Operational Objective C "Developing professional competences of HEI staff in the field of internationalisation" |

| | |
|---|--|
| | <ul style="list-style-type: none"> • Priority Objective IV. "Creating an international environment at HEIs and promotion abroad"; in particular operational objective B "Developing services offered to international students and staff" • Priority objective V. "Strengthening the strategic management of internationalisation"; operational objective A "Supporting comprehensive internationalisation at institutional level"; operational objective B "Supporting international cooperation of strategic partnerships and membership of international networks/organisations" |
| National Research and Innovation Strategy for Smart Specialization of the Czech Republic 2021-2027 (National RIS3 Strategy) | <ul style="list-style-type: none"> • RIS3 horizontal priorities; specific objective A.3 "Improving the functioning of innovation ecosystems at national and regional level"; specific objective B.1 "Improving the quality and societal relevance of public research", specific objective B.2 "Improving the quality of the environment for public research", specific objective C.1 'Improving the capacity of the education system to prepare people for research, development and innovation', specific objective C.2 'Developing skills for smart specialisation, industrial transformation and entrepreneurship', specific objective C.2 'Enhancing the potential and motivation of staff in research organisations' • RIS Thematic Priorities 3; domain 'Advanced Materials, Technologies and Systems'; domain 'Electronics and Digital Technologies'; domain 'Green Transport'; domain 'Advanced Medicine and Pharmaceuticals'; domain 'Green Technologies, Bioeconomy and Sustainable Food Resources' |
| National priorities for oriented research, experimental development and innovation | <ul style="list-style-type: none"> • Priority area "Sustainability of energy and material resources"; 1.1 "Renewable energy sources"; 1.3 "Fossil energy sources"; 1.6 "Energy in transport"; 2.1 "Reducing the energy intensity of the economy"; 2.2 "New technologies and processes with potential applications in the energy sector"; 3.1 "Advanced materials" • Priority area 'Environment for quality of life'; 1.2 'Water'; 1.4 'Air'; 2.2 'Biogeochemical cycles of nitrogen and phosphorus'; 2.3 'Hazardous substances in the environment'; 4.1 'Environmentally friendly technologies, techniques and materials'; 4.2 "Biotechnology, material, energy and emission efficient technologies, products and services"; 4.3 "Waste minimisation and reuse"; 4.4 "Removal of hazardous substances - old damage from the environment"; 4.5 "Minimisation of risks from chemicals" • Priority area 'Healthy population'; 2.1 'In vitro diagnostics'; 2.2 'Low molecular weight pharmaceuticals'; 2.4 'Drug delivery systems'; 2.5 'Gene, cell therapy and tissue replacement' |
| Megatrends and grand societal challenges (FUTURE-PRO project) | <ul style="list-style-type: none"> • Chapter 1 'Climate'; Calls 22 and 23 • Chapter 2 'Environment'; Calls 21, 23 and 24 • Chapter 3 'Resources'; Calls Nos 12, 13, 17 and 18 • Chapter 4 'Energy'; Calls Nos 16, 17, 19, 20, 21, 23 and 24 • Chapter 6 'Health'; Calls Nos 16, 18 and 19 • Chapter 12 'Consumption'; Calls Nos 12, 13 and 15 • Chapter 13 'Poverty and inequality'; Call No 23 • Chapter 17 'Science and Innovation'; Calls 25, 26 and 27 |
| Economic Strategy of the Czech Republic: the Czech Republic into the top 10 | <ul style="list-style-type: none"> • Area 1.2 "Research, development and innovation" • Area 2.1 "Energy infrastructure and decarbonisation" • Area 2.2 "Transport Infrastructure" |

| | |
|---|--|
| | <ul style="list-style-type: none"> • Area 2.4 'Economic security and business strategy' • Area 2.5 'Commodity security' • Area 3.2 'Advanced Technologies' • Area 3.3 'Strategic sectors' |
| Innovation Strategy of the Czech Republic 2019-2030 | <ul style="list-style-type: none"> • Pillar II "Polytechnic education" • Pillar III. "National start-up and spin-off environment" • Pillar V. "Innovation and Research Centres" • Pillar VIII. "Protection of Intellectual Property" |
| National Research, Development and Innovation Policy of the Czech Republic 2021+ | <ul style="list-style-type: none"> • Objective 2 "Support research organisations in creating motivating working conditions and developing the potential of people across the R&D spectrum" • Objective 3 "To increase the quality and international excellence of research and development in the Czech Republic, to increase the openness and attractiveness of the Czech Republic for international research and development and to intensify the integration of R&D&I of the Czech Republic into the European Research Area" • Objective 4 "Support the expansion of cooperation between the research and application spheres in the field of research, development and innovation". |
| National Strategy for Open Access to Scientific Information of the Czech Republic for 2017-2020 | <ul style="list-style-type: none"> • Priority 9.1.1 "Open access to scientific publications" • Priority 9.1.2 "Open access to research data" • Priority 9.4 "Education in OA/OA marketing" • Priority 9.6 "Long-term preservation of scientific information" |
| Gender Equality Strategy 2021-2030 | <ul style="list-style-type: none"> • Chapter "Work and care"; strategic objective 2 "Reduce gender inequalities in the labour market"; strategic objective 3 "Reduce the gender pay gap" • Chapter 'Decision-making'; strategic objective 1 'Increase the representation of women in decision-making positions'. • Chapter 'Knowledge'; strategic objective 3 'Applying a gender perspective in the operation and management of educational and scientific research institutions'. |

5.2 Research and development objectives

The HEI will describe its intentions and goals for the next five-year period. The objectives in the field of research development, innovation, and knowledge transfer as well as the objectives in the field of cooperation with public administration, entrepreneurs, and non-profit organisations will be described in relation to the mission, vision and disciplinary capacities of the HEI. Furthermore, the objectives for the development of the HEI as a research organisation will be described, in the areas of human potential development, institutional resilience, the implementation of open science and adherence to the principles of ethics, scientific integrity, and good practice, and their interrelationship with R&D&I objectives. The objectives described must be consistent with the Strategic plan for the teaching, scholarly, scientific, research, development, artistic and other creative activities of the higher education institution.

Maximum 2000 words.

Self-assessment:

In the next five-year period, in accordance with the Strategic Plan, UCT Prague will focus on the implementation of the following objectives:

- **Research and Development:** will continue to be a dominant and key source of funding for the University in the coming period. This is a completely strategic area where attention will be paid to administrative and organisational support and financial motivation of scientists in obtaining and solving projects. Assistance will be targeted in particular at the submission of applications for excellent calls such as ERC or GAČR EXPRO. The aim will be to obtain 2-3

excellent projects. A significant part of the incentive support will be focused on young researchers (post-docs) and PhD students, who provide a large part of the research and are important for maintaining the continuity of quality research at UCT Prague. In order to ensure a sufficiently attractive environment for a modern and competitive chemical research facility, it will be necessary to invest funds each year in the renewal and modernisation of instrumentation in the amount of at least CZK 20-30 million. Additional funds in the total amount of CZK 1-2 billion will have to be invested in the renovation and modernisation of buildings and laboratories on the university campus. The purchase of equipment that can be effectively shared by multiple teams, e.g. within the university's central laboratories, will be supported. Additional space will be sought to build laboratories to house excellent research teams. The aim will be to ensure and maintain the proportion of funding allocated to R&D at above 50% of the university's operating budget.

- **The area of innovation and knowledge transfer:** although many high-quality results of applied research have a very good potential for their further commercialization, the optimal conditions are still not created at UCT Prague to enable and sufficiently support effective knowledge transfer. Therefore, the task will be to modify existing or create new methodological procedures and set rules for the establishment of spin-off companies and start-ups, including upgrading the rules for rewarding authors of know-how. It will be important to anchor the Commercialisation Council in the university community as an important tool for transparent innovation management and knowledge transfer. There is a fundamental lack of venture capital to develop and upscale innovative ideas, so it will be crucial to find both internal (establish an innovation fund) and external (banking sector) sources to finance promising innovations. The TT department will also need to be strengthened in terms of staffing as the scope of its services increases. In the future, the income from knowledge transfer could constitute a regular income for the university in the amount of CZK 1 - 2 million per year.
- **Collaboration with industry:** traditional university-industry collaborations will be developed and strengthened, not only in terms of their potential for potential application of results in knowledge transfer, but also as an important additional source of funding for the university in the event of a reduction in public R&D revenues. The university will prefer to solve complex interdisciplinary research problems rather than simple analytical or technological services with lower impact. Collaboration with practice could be deepened by addressing socially relevant research activities focused on sustainability, energy and raw material savings, decarbonisation or high added value products. Examples of activities that the university plans to support are the development of the CirkTech research centre in Čížkovice (an organisational part of Technopark Kralupy), focused on recycling in construction, decarbonisation and processing of metal-bearing raw materials, including waste, the development of The Parc Centre for Applied Pharmaceutical Research with Zentiva and other universities and research institutes, or cooperation with ORLEN Unipetrol, as a strategic partner of the University, in the field of alternative fuels, hydrogen technologies and environmental protection. The results of the excellent ECO&Stor research project focusing on energy conversion and storage also have a high potential for practical application. The aim will be to maintain the volume of direct research and development cooperation with practice in the form of economic contractual activities at a level of at least 5% of the university's operating budget.
- **Human potential development:** the basis for the quality and excellence of research at UCT Prague is top-quality, sufficiently motivated, scientific staff. The university will therefore focus its efforts on ensuring optimal working conditions, including a transparent and fair system of remuneration for quality work, support for individual personal growth, a motivational career system or support for reconciliation of personal and professional life.

The permanent goal will be to ensure the income of employees at the level of at least the 3rd quartile of the best research institutions in the Czech Republic. Incentive financial support will also be focused on junior researchers, and it will be important to keep the proportion of PhD students at a level of at least 20% of the total number of students - the university budget will therefore allocate sufficient funds to finance scholarships, and Doctoral School activities will be supported and expanded as much as possible to improve study conditions. We expect that the number of foreign researchers and PhD students will increase at the university, therefore attention will be paid to setting up a functional bilingual environment (CZ/ENG), especially within the administrative support service. The challenge will be to maintain the HR Award.

- **The area of development of institutional resilience:** resistance to illegitimate influence from risky states is becoming one of the priorities of the research environment at UCT Prague. This mainly concerns applied research in the field of chemical technologies in the energy sector, materials research and nanomaterials for electronics or biotechnology and virology research, i.e. in areas where there is a particular risk of unwanted leakage of critical knowledge and know-how to countries at risk. Strengthening institutional resilience at UCT Prague includes, in particular, controlled management of recruitment of trainees and scientists from countries at risk, cyber security balanced in relation to the open science policy, organisational and physical security of access to research facilities with a potential risk of loss of information and know-how, professional training of employees to minimise the risks associated with establishing scientific contacts at the international level, as well as preventing the entry of capital from countries at risk to finance research activities and knowledge transfer.
- **Implementation of open science:** UCT Prague supports the principles of open science. A university fund has been created to support open access publishing - the amount of funding will be adjusted annually according to the current needs of authors. The university will make maximum use of the transformational contracts within the National Technical Library which offer vouchers for free open access publishing with selected publishers. In terms of open data, the university's group of Data Stewards will be further supported (staffed and funded) to provide methodological and factual support for the development and coordination of data management plans for research projects. Much attention will be paid to secure research data storage, preparations are underway to build a local university data repository (2026), while access to the EU community server (Zenodo) and the academic server in the Czech Republic (CESNET) will be optimised.
- **Adherence to the principles of ethics and scientific integrity:** adherence to the basic principles of ethics of scientific work and principles of scientific integrity at UCT Prague will be monitored in particular by reliability in ensuring the quality of research, honesty and transparency in conducting and assessing research, showing respect in research teams and responsibility in conducting research and presenting its results. Adherence to the ethics of scientific work is particularly important in relation to students and young scientists, who represent a significant part of the research teams at UCT Prague.

5.3 Institutional tools and measures for the implementation of the research and development strategy

The HEI will describe its institutional and strategic tools (e.g., strategic management tools, tools created to support the implementation of research objectives, legal and organisational norms in relation to R&D&I support, etc.) that are designed to fulfil the research and development objectives for the next five-year period (Table 5.3.1), with an emphasis on:

- Supporting quality R&D&I.
- Excellent science.
- Innovative environment and increasing the international or disciplinary competitiveness of the HEI's research activities.
- Development of human potential.
- Institutional resilience.
- Adherence to ethical principles, scientific integrity and good practice in R&D&I.

Maximum 2000 words.

Self-assessment:

To implement the research and development strategy, UCT Praha has been using the following tools:

- **To support quality R&D&I:** methodological and organisational support is provided centrally at the university level to the Project Centre (familiarisation with new project calls, training for grant applicants, formal checking of grant applications) and other rectorate departments (economics, HR, legal services, purchase of services and materials) with significant involvement of digitisation and information systems. For scientists preparing to submit a grant application, there is an incentive method for calculating personnel costs in the project, which reflects the level of personnel costs for each category of staff achieved in the previous calendar year and which allows young scientists and excellent scientists to set incentive bonuses in personnel costs. For PhD students, there is an Internal Research Grant Agency (annual funding of CZK 45 million), which serves as a "training environment" for novice grant researchers. Another tool is the internal competition "GET Your First Grant" with the aim to facilitate junior researchers to start their research careers and motivate them in their efforts to obtain their first grant with external funding (total funding of CZK 3 million; award for grant applicants of CZK 36,000 / CZK 72,000). Financial support for short-term hosting of renowned foreign experts (annual financial budget CZK 750 thousand; up to CZK 40,000 per stay) also helps to strengthen quality research. The availability of scientific literature and information resources (ChemTK chemical library) or tools to support open science, both in the field of publishing (Open Access) and in the management of scientific data (Open Data) - free tokens, a central fund to finance OA publishing (financial volume of at least CZK 1.5 million), assistance of Data Stewards, free access to servers for storing scientific data – these all are important for quality research. The quality of implemented or planned research activities as well as the quality of R&D-related support services is monitored by the Internal University Quality Assessment Board and the Scientific Committee of the Academic Senate.
- **To support of excellent science:** in addition to general methodological support, direct staff support for excellent projects is provided centrally at university level through the involvement of qualified project and financial managers. For the preparation of excellent international projects, the university is prepared to offer financial support from central sources to cover travel costs abroad (up to CZK 50,000). For excellent projects, the University has centrally allocated laboratory space (400 m² in total), which can be made available to the researcher for the duration of the project. For a scientific project whose successful solution promises the creation of an independent research direction, UCT Prague provides financial support from the Dagmar Procházková Fund (a three-year initiation project with an annual budget of CZK 2 million).

Excellent PhD students with the best publication activities and scientific achievements can receive the prestigious Votoček Scholarship (CZK 72,000 per year for the 30 best students).

- **To promote an innovative environment and increase the international or sectoral competitiveness of research activities:** to support the transfer of knowledge and innovation, a Commercialisation Council is established, which is an expert advisory body to the Vice-Rector for Science and Research in relation to the commercialisation of science and research results. The Council is composed of representatives of research organisations, the application sphere and the financial sphere. The protection of intellectual property is regulated by an internal directive, and a set of basic guidelines and information documents on knowledge transfer, inventions and improvements or the establishment of spin-off companies are available on the website. Significant support for the whole area of innovation and knowledge transfer is provided by the TAČR SIGMA project, which in the period 2024 - 2028 will enable the grant scheme at VŠCHT Prague to finance up to 15 internal partial "proof of concept" projects (total project subsidy of CZK 18 million). The rector's advisory body for strategic decision-making on issues of increasing the competitiveness of the University's research offer for the application sphere is the newly established Industrial Council of UCT Prague (April 2025).
- **To support the development of human potential:** the university has set all the basic documents and standards for a transparent recruitment procedure, for career development (procedure for appointment as associate professor and professor, attestation rules), for setting up employee remuneration for work (wage regulation), for working from home, work rules or job catalogue. The HR policy is set in accordance with the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers and is also subject to the obligations arising from the HR Award. The HR agenda is largely digitised and accessible in the internal HR information system. To evaluate the performance of academic staff, an electronic database of publication results, teaching performance, grant activity and involvement in the so-called 3rd role (Employee's profile) has been created; this information system is designed to support the management of staff capacity at institutes and faculties and to set motivational rewards and benefits. To support the personal growth of staff, the university offers seminars and workshops that cover many aspects such as ethics in publishing, intellectual property protection or project management. The implementation of a Doctoral School concept based on the European Competence Framework for Researchers (ResearchComp) has been launched with the aim of creating a comprehensive support system to complement doctoral studies with the development of key skills needed for scientific or industrial practice. The Counselling and Career Centre offers young researchers and PhD students a mentoring programme to support their personal growth. The Welcome Office provides help and assistance to foreign researchers and PhD students in dealing with administrative matters related to their stay and employment or studies. A positive social environment is fostered by the establishment of an ombudsman. The university has also set up incentive schemes for junior researchers, where a system of stabilisation allowances for researchers up to 5 years after defending their doctorate is now being piloted (total annual amount of funds CZK 5 million). Grant schemes - the Dagmar Procházková Fund (for a project whose successful solution promises the creation of an independent research direction) or awards - the Rector's Award for Excellence in R&D&I, the Julia Hamáčková Prize (to support the consideration of gender aspects in research and teaching work) also serve as a motivational tool for the development of human potential. UCT Prague also offers a number of employee benefits (meal allowance, contribution to retirement savings products, vouchers for the regeneration of mental and physical strength).
- **To promote institutional resilience:** a working group of representatives from all relevant areas (Computer Centre, Dept. Safety and Risk Prevention, Dept. Strategic Planning, Research and Technology Transfer Office, Centre for Information Services, Rector's Secretariat), which will

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| <p>coordinate the issue of institutional resilience in accordance with the methodological guidelines of the Ministry of Education and the Ministry of the Interior</p> <ul style="list-style-type: none"> • For compliance with ethical principles, scientific integrity and good practice in R&D&I: UCT Prague has an updated Code of Ethics, which is in line with the European Code of Research Integrity (revision 2023). Compliance with the basic principles of ethics in scientific work is monitored by the Ethics Committee of UCT Prague, which addresses possible violations of the provisions of the Code of Ethics based on suggestions from members of the university community. |
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5.3.1 Institutional tools and measures for the implementation of the research and development strategy

| Name of instrument/measure | Description of the tool/measure | Implementation status | Year |
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| Grant support provided by the Project Centre | Methodological, administrative and organizational support to researchers of domestic and foreign research grants. | Implemented | 2021 |
| Information system for project management (GAP) | An internal information system for the registration and management of research projects, which enables the planning of project research capacities, control of the correctness of costs, archiving of contractual documentation and statistical processing of information on submitted, solved and completed projects for the needs of university and faculty management. A general upgrade of the entire information system is currently underway. | Implemented partially | 2015 |
| Coordination of the process of setting personal costs for grants | Methodology for determining the method of planning, determining and reporting personnel costs in projects for individual categories of employees - amended annually in the form of an internal document | Implemented | 2016 |
| Research grants provided by an internal grant agency | Competition for a fundamental or applied research project aimed at deepening the creative and publishing activities of PhD students at UCT Prague | Implemented | 2010 |
| GET Your First Grant | Incentive one-off bonus for young scientists applying for a research project for the first time. | Implemented | 2024 |
| Support for short-term hosting of reputed foreign experts | Financial support to cover the costs of short-term stays of foreign experts at UCT Prague in order to establish pedagogical and scientific contacts | Implemented | 2020 |
| Providing quality electronic information resources and quality library services through ChemTK | ChemTK Chemistry Library is a joint project of three research and educational institutions - the National Technical Library, UCT Prague and IOCB CAS aimed at close cooperation in providing library services in the field of chemistry and related natural sciences. The library provides both traditional library services and 24/7 electronic access to 1,000 titles of multidisciplinary journal collections, citation and specialized databases and 12,000 titles of specialized e-books. | Implemented | 2017 |

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| Supporting Open Access (OA) publishing through the university fund | Financial support for corresponding authors from UCT Prague for OA publication of peer-reviewed articles in journals indexed on Web of Science and/or Scopus | Implemented | 2018 |
| Free Open Access (OA) publishing within CzechELib | Authors with UCT Prague affiliation have the opportunity to publish free of charge in OA mode with publishers with whom the university has concluded transformation agreements within the national project CzechELib. | Implemented | 2019 |
| Support for research data management in Open Data mode | Students and researchers have the opportunity to benefit from the expert assistance of Data Stewards in developing a data management plan, as well as expert assistance for data curation. The service will be further extended and improved. | Implemented partially | 2023 |
| Availability of research data repositories | UCT Prague has established an institutional community at the ZENODO repository (CERN) for archiving research data, including metadata management. UCT Prague also has free access to the CESNET data repository, which enables temporary storage and sharing of data within the project. Further options for high-capacity and secure data storage will be sought. | Implemented partially | 2022 |
| Availability of a high-capacity internal research data repository | University servers allow time-limited secure and structured storage of raw data, prior to further processing. Currently, the implementation of the server is still in the preparatory phase. | Not-implemented | |
| Monitoring the quality of the research environment | Each year a report on quality assurance of all activities of UCT Prague, including R&D activities, is presented. The fulfilment of the strategic objectives and compliance with the monitoring indicators set in the internal regulation Quality Assurance Rules are monitored (Articles 5 and 9 are devoted to the quality of R&D&I activities). | Implemented | 2018 |
| Financial support to applicants for the preparation of international projects | Financial support for travel costs or consultancy services for prospective investigators engaging in international research and innovation projects aims to increase the participation of new applicants or unsuccessful applicants in projects with international participation and e.g. ERC projects. | Implemented | 2020 |
| Shared labs for excellent research | UCT Prague at the central level has built and manages laboratory space (400 m ²), which can be lent for the duration of the project to the researchers of excellent grants. | Implemented | 2022 |
| Dagmar Procházková Fund | The fund provides financial support for a scientific project, the successful solution of which promises the creation of an independent research direction at UCT Prague. An eligible applicant is a postdoc with international experience who is not an employee of the university. | Implemented | 2019 |

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| Emil Votoček Scholarship | The Emil Votoček Scholarship is intended for students who, on the basis of the evaluation of the results of their professional activities, are ranked 1 st - 10 th among all students of the University of Science and Technology in Prague. The scholarship is awarded to another 20 PhD students with the best R&D scores at individual faculties. | Implemented | 2010 |
| Commercialisation Council | Expert advisory body to the Vice-Rector for R&D in relation to the commercialisation of science and research results, composed of internal and external knowledge transfer experts | Implemented | 2019 |
| Protection and enforcement of intellectual property rights | An internal directive that defines terms, establishes rights and obligations, regulates and unifies procedures in the area of creation, protection, application and use of intellectual property rights and copyrights at UCT Prague. | Implemented | 2018 |
| Support for Proof of Concept projects through an internal university competition | Financial support from the TAČR SIGMA project aimed at advancing the development of the technology and bringing it closer to exploitation. Support is focused on technologies intended for licensing or other exploitation, as well as on projects aimed at commercialisation through the establishment of a spin-off company. | Implemented | 2024 |
| University Innovation Support Fund | A central university fund, filled from the proceeds of contractual research collaboration with practice, commercialisation of technology transfer results or other external sources, which enabled it to finance the refinement and upscaling of innovative applied research results with potential market value, based on the recommendations of the Commercialisation Council. The establishment of such a fund is currently pending consideration. | Not-implemented | |
| Industrial Council | The rector's advisory body, whose members include 21 representatives of top management of leading domestic companies in the field of industrial chemistry, food industry, energy and environment, will be attended by permanent guests - representatives of ministries and professional associations. The year 2025 will be dedicated to the launch of this body. | Implemented partially | 2025 |
| Principles of HR Award | The implementation of the principles of the HR Award (Human Resources Strategy For Researchers) helps to ensure transparency in the employment of researchers, to create conditions for more attractive careers in scientific research and to meet the requirements of specific international project calls. UCT Prague demonstrates compatibility with the standards of research organisations in Europe. | Implemented | 2023 |
| Supporting PhD students through the Doctoral School | The Doctoral School creates and delivers a comprehensive system of support for doctoral study, including the development of key skills | Not-implemented | |

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| | needed for scientific or industrial practice. It is expected to launch in Q4 2025. | | |
| Mentoring programme for PhD students and postdocs through the Counselling and Career Centre | The mentoring programme provides a platform for networking and gaining experience in work and personal life. Mentors can advise on career direction, goal planning, overcoming obstacles or combining a scientific career with personal life. | Implemented | 2020 |
| Incentive programme for junior scientists | UCT Prague pays a stabilizing monthly salary supplement for scientists within 5 years of defending their doctorate. The instrument is in pilot testing until the end of 2025. | Implemented partially | 2024 |
| Welcome Office | Providing services for foreign researchers aimed at solving administrative issues related to residence permits, moving to the Czech Republic and concluding employment contracts in the Czech Republic. Assistance is also offered with the obligations that foreign employees have towards the Czech authorities - extension of residence permits, reporting changes to the Ministry of the Interior, advice on health insurance, etc. | Implemented | 2020 |
| Employee training | To support the personal growth of staff, the university offers seminars and workshops that cover many aspects such as ethics in publishing, intellectual property protection or project management | Implemented | 2020 |
| Rector's Award | An annual award coupled with a financial incentive for outstanding results in research and development. | Implemented | 2005 |
| Julia Hamáčková Prize | The Julia Hamáčková Prize is a competition aimed at promoting the consideration of gender aspects in research and pedagogical work. The prize is awarded annually in three categories: outstanding contribution of women, promotion of equal opportunities, best female-student work. | Implemented | 2015 |
| Employee benefits | UCT Prague strives to create a creative and pleasant working environment for its employees. Therefore, it provides a number of employee benefits: flexible working hours, meal allowance, the possibility of working from home, pension contribution, educational and professional courses. | Implemented | 2010 |
| Positive social environment for the university community | UCT Prague has long strived for a cultural, fair and friendly environment. It rejects all forms of behaviour that violate human dignity, including discrimination, aggression, bullying, intimidation, sexual violence or other forms of oppression. The area of social safety is the responsibility of the University Ombudsperson. | Implemented | 2024 |
| Cybersecurity measures | UCT Prague has established rules for the use of the computer network, where the method of operation is defined and procedures for dealing with security incidents are established. Protection against cyber-attacks uses several levels of protection: academic community | Implemented partially | 2022 |

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| | protection, perimeter and data-centre firewalls, network segmentation, continuous network monitoring. Depending on the legislation, further measures are in the pipeline. | | |
| Control of suppliers and application of international sanctions | As part of its activities, UCT Prague uses an effective electronic tool for detecting potential risks in the area of conflict of interest and for checking obligations arising from national or European legislation in relation to the application of international sanctions. This tool is the Cribis application from CRIF - Czech Credit Bureau. | Implemented | 2022 |
| Code of Ethics and Ethics Committee | The Code of Ethics specifies the ethical principles applied at UCT Prague - the area of research is addressed in Article 3. For members of the academic community, two roles of the Code can be distinguished and therefore two roles of the Ethics Committee: 1) assessing and approving scientific and research activities, 2) assessing arbitrary activities and actions of members of the academic community in the context of the Code of Ethics. | Implemented | 2015 |

5.4 Implementation of the recommendations in Module 5

The HEI will briefly describe how it has implemented the recommendations for Module 5 from the previous evaluation period, if applicable.

Maximum 1000 words

Self-assessment:

The IEP 2020 Evaluation Report made the following recommendations:

5.1 R&D&I MISSION AND VISION: *The recommendation relating to the establishment of a well-balanced International Advisory Board, as recommended under Module 4, is critical here. It is also essential that there is an extensive consultation with staff and students in developing the UCT mission, vision and aims further and that these are consistently embedded throughout the UCT*

Implementation of the recommendation: in October 2022, the International Advisory Board of UCT Prague was created as an advisory body to the Rector, primarily for determining and assessing the main directions of scientific and educational activities, research and educational programmes, the social role of the University, its international status, the funding system and evaluation methods. It currently has 7 members and its activities are regulated by the Statutes and Rules of Procedure. All matters of a strategic nature are discussed at various levels of governance: colleges of vice-rectors and vice-deans, colleges of the Rector, meetings of the Academic Senate and its expert committees, meetings of the Scientific Council and meetings of the Board of Trustees. Only these discussed proposals and adjustments are implemented in the annual plans for the implementation of the strategic plan of UCT Praha.

5.2 R&D&I OBJECTIVES AND STRATEGIES: *It is recommended that the strategic objectives are developed further in line with the stakeholder needs.*

Implementation of recommendations: strategic issues are discussed and negotiated with representatives of the main employers - the Confederation of the Chemical Industry of the Czech

Republic and the Food Chamber of the Czech Republic. Strategic issues are further discussed with the International Advisory Board of UCT Prague and, in the case of knowledge transfer, with the Council for Commercialisation UCT Prague.

5.3 / 5.4 R&D&I NATIONAL AND INTERNATIONAL CONTEXT: The leadership of UCT should consider in a structured manner the most suitable management and project management tools that could support them in the strategic leadership of the UCT. These should become an integral part of the work of the leadership team.

Implementation of the recommendation: a new "data mining" group is involved in management support to extract data from internal information systems and the data warehouse. Annual evaluations of the strategic plan are used for management control, where individual activities are normally addressed in a project form with a set timetable, expected outputs and monitoring indicators, which are set in accordance with the internal regulation Quality Assurance Rules (Articles 5 and 9 are devoted to the quality of R&D&I activities).

5.5 TOOLS FOR IMPLEMENTING THE RESEARCH STRATEGY: In addition to the proposed institutional tools, a consideration should be given to tools for building critical mass in the three R&D&I pillars as well as emerging themes.

Implementation of the recommendation: ensuring a critical mass of researchers in all three research pillars is influenced by the independent policies of individual faculties. In particular, coordination in budgeting, administrative support in HR or allocation of laboratory space for the duration of the project is provided from the central level of the Rector. Building critical mass in selected scientific areas must be in line with the setting of disciplinary capacities.

MODULE 4 AND MODULE 5 - OVERALL ASSESSMENT: There are a range of recommendations that IEP believes would strengthen the position and the impact of UCT and these are detailed in each required section. The most significant improvements both from the point of view of organisation of R&D&I and the mission/vision/strategy are highlighted below:

- 1. Initiating a UCT-wide review of the organisational structures leading to streamlining and better alignment of activities, considering the establishment of UCT-wide units for teaching subjects currently covered by individual schools in certain Faculties, thus placing undue stress on these. Such review would enable better alignment of research activities and resources and better strategic prioritisation of these.*
- 2. Setting up a UCT-wide doctoral school with standardised procedures for training particularly in professional research competencies and progress monitoring, broadening the opportunities for exchange of ideas/collaboration and strengthening the research environment throughout the UCT.*
- 3. Establishing and embedding HR procedures relating to workload allocation, gender balance and sabbaticals as discussed above.*
- 4. Establishing an International Advisory Board with appropriate representation in order to provide advice on the above and general regular feedback on activities and performance.*
- 5. Regular review (and introduction, where necessary) of R&D&I policies, including data management to ensure regular internal evaluation of the impact of various measures to manage R&D&I activities across the UCT.*
- 6. Extend the work on the clear formulation and UCT-wide embedding of the mission/vision/strategy, utilising the advice of the International Advisory Board and the various management tools suitable for this purpose, not just the SWOT analysis.*

Implementation of the recommendations:

1. In 2023, a discussion was initiated on modifying the teaching of mainly mathematics and basic chemistry subjects to better meet the needs of undergraduate studies, to reduce the high failure rate and at the same time the teaching load of teachers, and to provide them with more space for conducting research. The modification of teaching will be accredited this year. With the aim of rationalisation, the Institute of Mathematics and the Institute of Computer and Control Engineering were merged into the new Institute of Mathematics, Computer Science and Cybernetics in 2023. Similarly, at FTOP, the Institute of Gaseous and Solid Fuels and Air Protection and the Institute of Petroleum Technology and Alternative Fuels were merged into the new Institute of Sustainable Fuels and Green Chemistry in 2024.
2. An amendment to the Higher Education Act, approved in February 2025, enabled the process of implementing the Doctoral School concept based on the European Competence Framework for Researchers (ResearchComp) to begin. The aim of the Doctoral School will be to create a comprehensive support system that complements doctoral studies with the development of key skills needed for scientific or industrial practice. The launch is expected in Q4 2025.
3. Winning the HR Award in January 2023 initiated a two-year implementation phase aimed at establishing compatibility with the standards of research organisations in Europe and harmonising internal regulations and HR work based on the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.
4. See answer for 5.1 R&D&I MISSION AND VISION.
5. See answer for 5.3 / 5.4 R&D&I NATIONAL AND INTERNATIONAL CONTEXT.
6. See answer for 5.1 R&D&I MISSION AND VISION and 5.3 / 5.4 R&D&I NATIONAL AND INTERNATIONAL CONTEXT.

A LIST OF SUPPORTING DOCUMENTS/LINKS FOR MODULE 5

| Document name | No. criteria | Location (link in HTML) |
|---|--------------------|---|
| The Research Universities Association (RUA) | 5.1 | https://www.avuni.eu/en |
| Programme Johannes Amos Comenius | 5.1 | https://opjak.cz/en/ |
| Evaluation According to the Methodology M17+ | 5.1 | https://m17.rvvi.cz/en// |
| HR Award UCT Prague | 5.1, 5.2, 5.3, 5.4 | https://www.vscht.cz/career/hr-award |
| International Advisory Board UCT Prague | 5.1, 5.4 | https://www.vscht.cz/about-us/authorities/international-advisory-board |
| The Strategic Plan of the Ministry for Higher Education for the period from | 5.1.3 | https://msmt.gov.cz/areas-of-work/tertiary-education/strategic-plan- |

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| 2021 and The Internationalisation of Higher Education Strategy for the period from 2021 | | of-the-ministry-for-higher-education-for-the |
| National Priorities of Oriented Research | 5.1.3 | https://vyzkum.gov.cz/FrontClanek.aspx?idsekce=782681 |
| Economic Strategy of the Czech Republic: The Czech Republic into the top 10 | 5.1.3 | https://www.euractiv.com/section/politics/news/czechia-aims-to-be-among-the-eus-top-10-economies-by-2040/ |
| Innovation Strategy of the Czech Republic 2019 - 2030 | 5.1.3 | https://vyzkum.gov.cz/FrontClanek.aspx?idsekce=867922 |
| National Research, Development and Innovation Policy of the Czech Republic 2021+ | 5.1.3 | https://vyzkum.gov.cz/FrontClanek.aspx?idsekce=932081 |
| Strategic Plan of Educational and Scientific Research, Development and Innovation, Artistic or Other Creative Activities of UCT Prague for the Period from 2021 | 5.2, 5.3 | https://www.vscht.cz/files/uzel/68602/0001~Hc1BDoJQDATQq8wBWCg3IOjCIUT0AM2nH5rArynln9_KahbzJjO6kfMsCcNKBZpxn45ELlpoBZUJYxluLjni3cmS0uDg1de9btFc6JHKVrPVYPOXHYPProanL2zojaOrjC5FiAvv_6dP_8ZgNB-MHDYoBjbRCdl0Q3tprz8.pdf?redirected |
| Project Centre | 5.2, 5.3 | https://www.vscht.cz/research/project-centre |
| Commercialization Council | 5.2, 5.3 | https://www.vscht.cz/research/technology-transfer/commercialization-council |
| Technology transfer UCT Prague | 5.2, 5.3 | https://www.vscht.cz/research/technology-transfer/about-us |
| Technopark Kralupy UCT Prague | 5.2 | https://www.technopark-kralupy.cz/home |
| The Parc | 5.2 | https://www.theparc.eu/ |
| Welcome Office UCT Prague | 5.2, 5.3 | https://international.vscht.cz/international-staff |
| Open Science at UCT Prague | 5.2, 5.3 | https://open.vscht.cz/?jazyk=en |
| Counter Foreign Interference Manual for the Czech Academic Sector | 5.2, 5.3 | https://mv.gov.cz/chh/clanek/terorismus-web-aktuality-aktuality-protivlivovy-manual-pro-sektor-vysokych-skol.aspx |
| Code of Ethics and Ethics Committee of UCT Prague | 5.2, 5.3 | https://www.vscht.cz/about-us/authorities/ethics?jazyk=en |
| Services for researchers | 5.3 | https://www.vscht.cz/research/project-centre/support-for-projects |
| Internal Grant Agency (IGA) UCT Prague | 5.3 | https://www.vscht.cz/research/internal-grant-agency |

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| GET Your First Grant | 5.3 | https://www.vscht.cz/research/internal-grant-agency/get-en |
| Support of short-term hosting of renowned foreign experts | 5.3 | https://intranet.vscht.cz/business-travel-and-exchanges/support-of-short-term-hosting |
| Dagmar Procházková Fund | 5.3 | https://www.vscht.cz/research/dagmar-prochazkova-fund |
| Preparing Doctoral School at UCT Prague | 5.3, 5.4 | https://phd.vscht.cz/phd-students/educational-courses |
| Counselling and Career Centre of UCT Prague | 5.3 | https://pkc.vscht.cz/?jazyk=en |
| Career at UCT Prague | 5.3 | https://www.vscht.cz/career |
| Employee Handbook | 5.3 | https://www.vscht.cz/career/employee-handbook |
| Employee benefits | 5.3 | https://www.vscht.cz/career/benefits |
| Employee training | 5.3 | https://www.vscht.cz/career/employee-training |
| Positive social environment at UCT Prague | 5.3 | https://www.vscht.cz/about-us/positive-social-environment?jazyk=en |