



EKITMCMXIX

University of Zagreb
Faculty of Chemical
Engineering and Technology

SELF-ANALYSIS

2022



FKITMCMXIX

University of Zagreb
Faculty of Chemical
Engineering and Technology

NAME |

Self-analysis of the Faculty of Chemical Engineering and Technology, University of Zagreb

Self-analysis of the Faculty of Chemical Engineering and Technology was adopted at the 252nd regular session of the Faculty Council, held on January 24, 2022. (Class: 003-01/22-02/4; File no.: 251-373-5-22-1)

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TRANSLATION |

Ad Acta prijevodi d.o.o

Palijan d.o.o.



University of Zagreb
Faculty of Chemical
Engineering and Technology

Name of higher education institution | Faculty of Chemical Engineering and Technology,
University of Zagreb

Year of foundation | 1919

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Terms used in this document that have a gender meaning are used neutrally and refer equally to males and females.



Sveučilište u Zagrebu
Fakultet kemijskog inženjerstva i tehnologije



Klasa: 003-01/22-02/4
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Zagreb, 25. siječnja 2022.

Temeljem članka 16. Statuta Fakulteta kemijskog inženjerstva i tehnologije Sveučilišta u Zagrebu (Fakultet), u postupku provedbe reakreditacije Fakulteta, Fakultetsko vijeće Fakulteta na prijedlog Povjerenstva za Samoanalizu i reakreditaciju Fakulteta kemijskog inženjerstva i tehnologije Sveučilišta u Zagrebu, Fakulteta, na 252. redovitoj sjednici održanoj dana 24. siječnja 2022. godine donijelo je sljedeću

ODLUKU

I.

Prihvaća se Samoanaliza Fakulteta kemijskog inženjerstva i tehnologije Sveučilišta u Zagrebu za postupak reakreditacije 2022. godine.

II.

Samoanaliza Fakulteta kemijskog inženjerstva i tehnologije Sveučilišta u Zagrebu iz t. I. nalazi se u prilogu ove Odluke i čini njezin sastavni dio.

Dekan
Prof. dr. sc. Ante Jukić



Dostaviti:

1. Agencija za znanost i visoko obrazovanje
2. Mrežne stranice Fakulteta
3. Pismohrana, ovdje

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INTRODUCTION

Historical development of the Faculty of Chemical Engineering and Technology

The roots of the Faculty of Chemical Engineering and Technology date back to 1919, when the **Technical Institute Zagreb** was founded with the aim of "*providing a thorough theoretical and as far as possible, practical education for those technical occupations whose professions are represented in the institute.*"

One of the departments at that time was chemical engineering, whose first dean Prof. **Vladimir Njegovan**, Ph.D., strove from the very beginning to provide educational and research work on the model of European and American universities. The names of **Ivan Marek**, the famous inventor of the furnace for elementary organic chemical analysis, **Ivan Plotnikov**, a world-renowned photochemist, **Franjo Hanaman**, the inventor of tungsten incandescent filaments and a little later **Vladimir Prelog**, the future Nobel laureate, testify to how successful he was.

In 1926, the Technical Institute Zagreb grew into the **Technical Faculty of the University of Zagreb** (with the Department of Chemical Engineering), which enabled teachers and associates more intensive scientific work. Along with Vladimir Prelog, who was the first to introduce organic synthesis in Croatia, there is also a plethora of younger scientists who have proven themselves in the world of science and technology. These are **Vjera Marjanović-Krajovan**, **Rikard Podhorsky**, **Karlo Weber**, **Matija Krajčinović** and **Miroslav Karšulin**. All of them went abroad for scientific training and, upon their return, they transferred the acquired knowledge, raising the level of knowledge and influencing the development of the profession.

After the restructuring of the Technical Faculty, from 1956 the study of chemical engineering was conducted at the Faculty of Chemical, Food and Mining Technology, and from 1957 within the newly established **Faculty of Technology**. In 1978 the Faculty of Metallurgy was separated, in 1980 the Faculty of Food Technology and Biotechnology and, finally, with the separation of the **Faculty of Chemical Engineering and Technology** and the Faculty of Textile Technology on November 16, 1991, the long-standing aspiration for independence of the chemical engineering study was fulfilled.

Since its foundation until today, the study of chemical engineering has paid full attention to the education of scientific, research, and professional youth in the field of chemistry and chemical engineering, disciplines that are intertwined and complementary. In 2005, with the introduction of the Bologna model of education, as a result of respectable scientific activity in the fields of chemistry, chemical engineering, basic technical sciences and interdisciplinary technical sciences, four undergraduate and four graduate study programmes were proposed and accepted: **Chemical Engineering**, **Environmental Engineering**, and **Material Science and Engineering** in the field of technical sciences and **Applied Chemistry** in the field of natural sciences. Today, the Faculty has a permit for conducting elections to scientific and scientific-educational titles in the field of natural sciences (field of chemistry), and in the field of technical sciences (fields of chemical engineering and basic technical sciences).

The fruitful scientific activity of the Faculty's teachers was the basis for the organisation of postgraduate study programmes (PS) of great importance. Already in the academic year 1960/1961 the PS programme **Corrosion and Protection of Materials** was introduced, and in 1963/1964 the PS programme **Chemistry and Silicate Technology** was also introduced.

In 1965, the PS programme **Engineering Chemistry** was organised, which was systematically changed and supplemented until 1992. Upon completion of the study, the title of Master of Science in the field of chemistry or chemical engineering was acquired, depending on the topic of the master's thesis and the enrolled courses. With the introduction of the Bologna model in 2005, postgraduate doctoral study (PDS) programmes **Engineering Chemistry** in the area of natural sciences, field of chemistry and the area of technical sciences, field of other basic technical sciences, and **Chemical Engineering** in the area of technical sciences, field of chemical engineering were introduced. Since academic year 2013/2014, and at the instigation of the University of Zagreb, the Faculty was the first to combine the doctoral studies in Engineering Chemistry and Chemical Engineering. An accreditation procedure was carried out and the Faculty received a university permit to conduct a new doctoral study programme **Chemical Engineering and Applied Chemistry** in the academic year 2013/2014. The University of Zagreb issued the Faculty a permit for the university specialist study programme **Petroleum and Petrochemical Engineering**, which was initiated on the basis of the expressed interest of the Croatian petrochemical industry and in agreement with it in the academic year 2013/2014. Furthermore, the Faculty is the coordinator of university postgraduate specialist studies programmes **Environmental Engineering** and **Corrosion and Protection**.

The Faculty today

The Faculty is a part of the University of Zagreb. Although it is an independent legal entity, the activities of the Faculty are harmonized with the Statute of the University, its current Development Strategies and all other legal and normative acts of the University. The Faculty of Chemical Engineering and Technology is a higher education institution that does the following in the scientific field of chemical engineering and the scientific field of chemistry:

- organises and conducts university undergraduate, graduate, doctoral and specialist study programmes
- organises and performs scientific work related to the educational process through doctoral and specialist studies
- realizes projects for the economy and in cooperation with the economy
- organises colloquia, seminars, symposia, and other scientific and professional conferences
- publishes scientific and professional papers, books, monographs, textbooks, scripts, bulletins, etc.,
- popularizes scientific and professional results
- cooperates with scientific, professional, educational, and other organisations in the fields of its own and related activities.

Organisation of the Faculty of Chemical Engineering and Technology

The organisational structure of the Faculty is presented in Figure 1.1. **The governing bodies of the Faculty** are the Dean and the Faculty Council. **The organisational units of the Faculty** are the departments, the Cabinet of Social Sciences and Humanities (the Cabinet), the Library and Information Centre and the Secretariat. **The departments and the Cabinet of the Faculty** are organised in accordance with the educational and scientific research activities of the Faculty. The department/Cabinet is managed by the head.

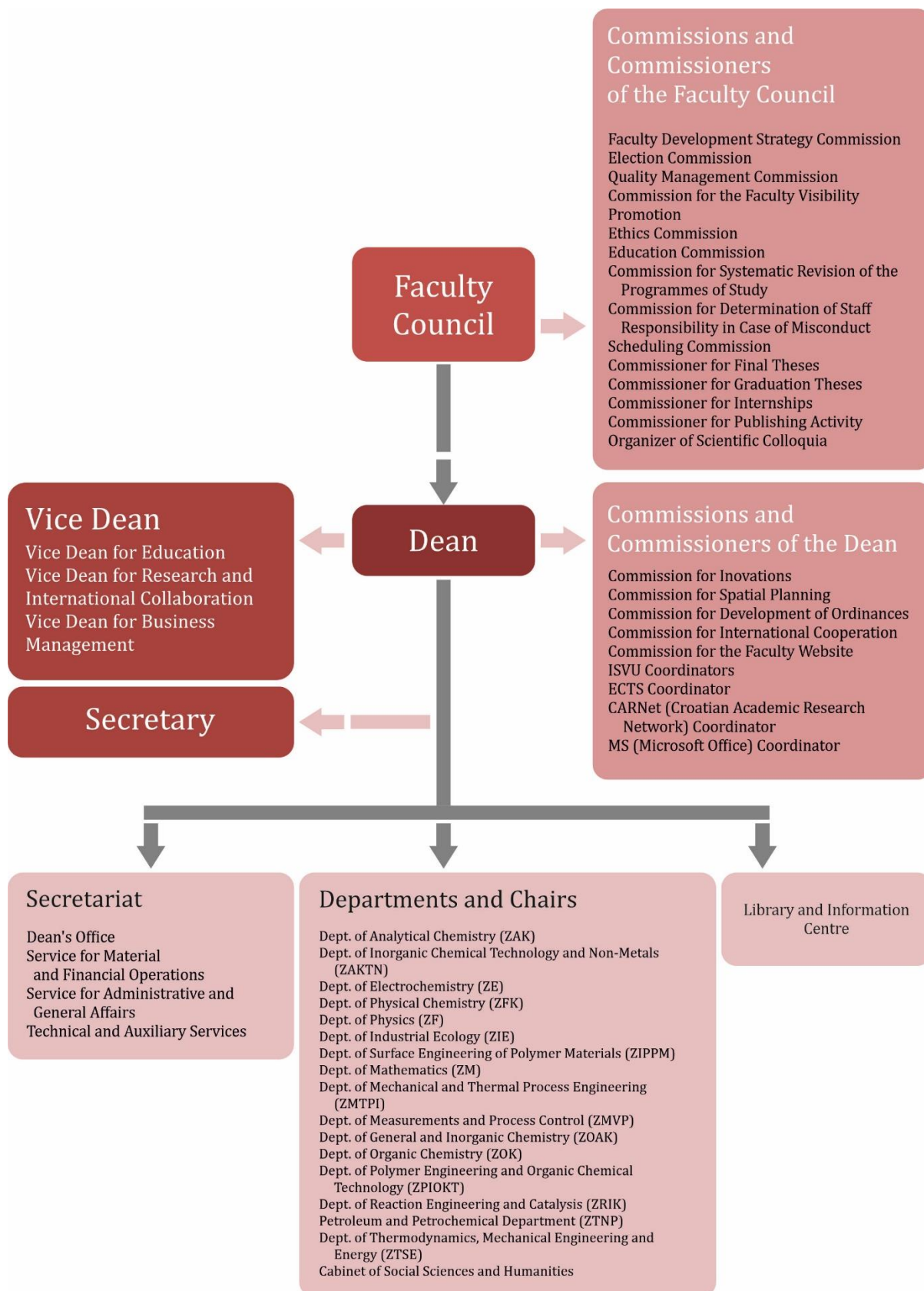


Fig. 1 Organisational structure of the Faculty

The Library and Information Centre (BIC) is an organisational unit and central library of the Faculty managed by a senior librarian.

The Secretariat of the Faculty is an organisational unit in which joint professional, general and auxiliary activities of the Faculty are performed. The work of the Secretariat is managed by the Secretary. The Secretariat consists of: Dean's Office, Service for Administrative and General Affairs, Service for Material and Financial Operations and Technical and Auxiliary Services.

The Dean manages the Faculty, s/he is its leader and head. The Dean is elected by a secret ballot for two years by the Faculty Council according to the rules established by the Statute of the Faculty. The Dean represents the Faculty, organises and leads the work and operations of the Faculty, makes business decisions in accordance with regulations, chairs the Faculty Council and proposes the agenda of the Faculty Council sessions, is a member of the relevant University area council, proposes measures to improve the work of the Faculty to the Faculty Council, implements decisions of the Faculty Council, decisions of the Senate and the Council of areas related to the Faculty, authorizes another person to represent the Faculty, appoints persons authorized to sign financial and other documents, decides on investment maintenance; proposes the election of vice deans to the Faculty Council, initiates and conducts disciplinary proceedings for employees of the Faculty, makes second instance decisions in administrative cases, performs other tasks in accordance with the Act on Scientific Activity and Higher Education, University Statute, and the Faculty Statute.

The dean is assisted in his work by the vice deans and the secretary. The faculty has three vice deans:

- Vice Dean for Education
- Vice Dean for Business Management
- Vice Dean for Research and International Collaboration.

Vice deans are elected and dismissed by the Faculty Council on the proposal of the dean by secret ballot. In case of an absence of the dean, the Faculty is represented by one of the vice deans. Vice deans can be elected from the ranks of professors elected to the scientific-educational title. Vice deans are elected for a term of two years. The vice deans are accountable for their work to the dean and the Faculty Council.

The Vice Dean for Education combines tasks related to the implementation and improvement of educational programmes in undergraduate and graduate study programmes and lifelong learning programmes, and performs tasks related to professional development and publishing.

The Vice Dean for Business Management integrates the work on creating the business and development policy, the Faculty budget, financial plan or annual implementation plan and programme of the Faculty. He/she takes all necessary measures for the preparation and implementation of these documents, including providing sources of funding, and takes the necessary measures for coordination and successful operation of individual organisational units within his/her scope.

The Vice Dean for Research and International Collaboration combines activities related to the implementation and improvement of postgraduate study programmes and international cooperation in the field of educational, scientific, and professional activities of the Faculty.

The Secretary of the Faculty is an employee with special rights, powers and responsibilities who organises and coordinates the work of the Secretariat, makes first instance decisions in administrative cases, and performs other tasks determined by acts of

the Faculty and by order of the Dean of the Faculty. The Secretary is accountable for his work to the Dean of the Faculty.

The Faculty Council is the professional council of the Faculty. The Faculty Council consists of all teachers elected to scientific-educational titles, five representatives of teachers and associates elected to educational and associate titles and representatives of undergraduate, graduate, and postgraduate students of the Faculty. Student representatives make up at least 15% of the total number of Council members, which means that they are also included in the management structure of the Faculty.

Representatives of teachers and associates are elected by teachers and associates for a period of two years. Student representatives participate in the work of the Faculty Council in the manner determined by the Statute and the Student Union Act and other student organisations. Student representatives participate in the work of the Faculty Council on an equal footing with other members, except in the procedures for obtaining a doctorate in the sciences, election of nominees for the honorary title of *professor emeritus* and election to scientific-educational titles. When deciding on issues of special interest to students, student representatives have the right of suspensive veto. Issues of special interest to students are those related to regulating the rights and obligations of students, changing the study system, ensuring the quality of studies, adopting the curriculum, determining the implementation of curricula, and student standards.

The Faculty Council adopts the Faculty Statute by a majority of the total number of members, elects deans and vice deans, conducts elections for members of the Area Councils and the Senate, accepts the annual report of the dean, adopts the budget and balance sheets of the Faculty, takes care of studies and scientific work and makes decisions in the field of quality assurance, initiates the process of adoption and takes care of the implementation of curricula, studies, research projects, and gives an opinion on the proposal of university curricula in whole or in part of its activities, proposes the act on the organisation of job posts at the Faculty to the Dean, proposes educational, scientific and professional programmes to the Senate, determines the topics of undergraduate and graduate theses as well as their mentors, appoints, at the suggestion of applicants, mentors in the preparation of doctoral dissertations, appoints committees in the process of obtaining master's and doctoral degrees, gives consent for the work of teachers outside the Faculty and the University and submits proposals to the University Senate for final adoption, establishes new and develops existing research capacities at the level of the appropriate scientific discipline, initiates and conducts elections to scientific-educational titles, educational and associate titles in accordance with the Act; adopts the curriculum for the current academic year at the proposal of the department or cabinet, provides conditions for freedom of initiative of individuals and groups of researchers, teachers and students in scientific, educational and professional activities, gives an opinion on the purchase, installation and use of capital, medium and small equipment to the Faculty, gives consent to the Dean for undertaking legal actions on behalf and for the account of the Faculty in the value above 1,000,000 kuna and to 3,000,000 kuna, makes a decision on announcing a public vacancy in each election procedure and appoints an expert committee for conducting the procedure for election to a scientific-educational or educational title, conducts the procedure for obtaining a doctorate in the sciences, initiates the procedure for awarding the title of *professor emeritus*, adopts rules of procedure and performs other tasks in accordance with the Act on Scientific Activity and Higher Education, University Statute and Faculty Statute.

The Faculty Council appoints committees to resolve certain issues within its competence. The number of members of the commission and the scope of their work is determined by the decision on appointment. The members of the committee are mostly

persons in the scientific-educational profession and in permanent employment at the Faculty, and in some committees also students. The Faculty Council discusses and decides on matters within its competence at its sessions. Regular sessions of the Faculty Council are usually held once a month. If necessary, extraordinary sessions of the Council are held. The Faculty Council validly discusses and decides when more than half of the total number of members are present at the session.

The course of writing the Self-analysis

The Accreditation Council of the Agency for Science and Higher Education (ASHE) at its 117th session held on June 16, 2020, adopted the [Higher Education Institutions Re-accreditation Plan in 2021](#), including the Faculty of Chemical Engineering and Technology. A visit of the expert committee to the Faculty has been announced in the period from December 13 to 17, 2021.

Due to the fact that the re-accreditation was planned during the difficult operation of the Faculty due to the coronavirus pandemic, earthquake, and intensive work in preparing reconstruction projects with strict deadlines, the re-accreditation of the Faculty was postponed at the [request of the Dean](#) and the [approval of ASHE](#). It should be noted that all departments and services of the Faculty were involved in the procedures for preparing documentation for the renovation of all three buildings in which the Faculty operates. [A letter from the Accreditation Council of ASHE](#) set the final date for the re-accreditation procedure from March 3 to 7, 2022, with the deadline for submission of documents being February 7, 2022.

At its 244th session held on March 21, 2021, the Faculty Council adopted a [Decision on the appointment of members of the Committee for Self-analysis and Reaccreditation](#), which was supplemented by a [Decision](#) at its 247th regular session held on July 12, 2021. In the period from October 2020 to September 2021, by the [decisions of the Dean](#), one teacher was appointed as the coordinator and nine administrators of the information system MOZVAG2 were also appointed.

The members of the Committee are divided into teams according to the chapters of Self-analysis, and the coordinators of individual teams are determined. This was followed by preparations for entering data into the MOZVAG2 system, writing a Self-analysis, collecting the necessary documentation, reaching mutual agreements, and holding team meetings.

During the preparation of the Self-analysis, the members of the Committee for Self-analysis and Re-Accreditation and the appointed administrators of the MOZVAG2 information system participated in all trainings related to its preparation. Thus, on October 27, 2020, some members of the Self-analysis Committee attended a training on self-analysis conducted online and intended for representatives of higher education institutions participating in the re-accreditation in 2021, organised by ASHE.

Furthermore, the appointed administrators of the MOZVAG2 information system participated in a webinar on reconstructed MOZVAG2, CROSBI and Project Databases on December 8, 2020, organised by ASHE in cooperation with the University Computing Centre – Sreće and the Ruđer Bošković Institute's Scientific Information Centre.

The head of BIC participated in a webinar for administrators of the Croatian Scientific Bibliography – CROSBI (held on October 27, 2021, organised by the Centre for Scientific Information and the Ruđer Bošković Institute in cooperation with the Department of Analytics and Statistics of ASHE), a webinar for administrators of Databases of project

activities in science and higher education in the Republic of Croatia – Poirot (held on October 28, 2021, organised by the Centre for Scientific Information and Ruđer Bošković Institute in cooperation with the Department of Analytics and Statistics of ASHE) and lectures related to the Dabar database (Conference "Srce E-Infrastructure Day 2021" thematic block Information and data in science).

The draft of the Self-analysis was given for review and correction to all team coordinators and members of the Management Board. The Self-analysis was proofread and translated into English.

Self-analysis of the Faculty of Chemical Engineering and Technology was adopted at the 252nd regular session of the Faculty Council, held on January 24, 2022.

I Internal Quality Assurance and Social Role of a Higher Education Institution

I.1 The Higher Education Institution has implemented a functional internal Quality Assurance System

The internal Quality Assurance System encompasses and evaluates all activities of the Higher Education Institution (study programmes, teaching process, student support, support to students from under-represented and vulnerable groups, learning resources, scientific or artistic activities, professional activities, and similar) and provides the underlying documentation.

The internal Quality Assurance System actively involves all Higher Education Institution stakeholders (students and external stakeholders, such as employers, alumni, professional associations representatives, civil society organisations or associations, as well as internal stakeholders).

The Higher Education Institution has adopted Quality Assurance Policy as part of the Higher Education Institution strategic management, by implementing a strategy, which includes, among the other, the Strategic Programme for Scientific Research, for a minimum period of five years.

The strategy implementation includes SWOT or similar analysis, strategic objectives, programme agreement objectives (where applicable), operational plan, defined implementation responsibility, monitoring mechanisms, and reports on its fulfilment. The stakeholders have recognised the strategy as an efficient tool for Higher Education Institution improvement.

The Higher Education Institution systematically collects and analyses data regarding its processes, resources, and results and uses them for efficient management, improvement of its activities, and further development.

The Higher Education Institution uses different methods to collect information about quality (through student surveys about lectures, satisfaction surveys about study programmes, co-operation evaluation, employers' or associates' feedback, feedback from graduated students, and similar).

The Higher Education Institution is dedicated to the development and implementation of human resources management policies (management, teaching, scientific, artistic, administrative, professional, and technical policies), in accordance with the industry principles and standards.

The internal Quality Assurance System (QAS) at the Faculty of Chemical Engineering and Technology of the University of Zagreb continuously promotes the Quality and achievement of its highest level in educational, scientific, professional, and administrative activities. The Faculty Quality Assurance System underlying documentation consists of:

- [The Faculty Quality Assurance System Ordinance](#) – this ordinance regulates the organisation of a quality assurance system, its basic processes, quality assurance areas, organisation, function, and operating mode of the Quality Management Commission, and areas in which the Faculty conducts quality assurance measures and activities. This document defines mechanisms for monitoring the Faculty Quality Assurance System activities results and fulfilment indicators.
- [The Faculty Quality Assurance Manual](#) – this manual describes the Faculty areas of quality assurance and improvement and specifies corresponding standards, objectives, and lists of activities for each area. The ownership is designated for each activity, in terms of proposal, drafting, implementation, and issuance, including the implementation period, performance indicators and good practices. The manual encompasses the following areas:
 1. development and implementation of rules and procedures in permanent quality assurance and promotion of all Faculty activities areas (point 5.1)
 2. proposing, drafting, quality management, internal and external evaluation of study programmes (point 5.2)

3. evaluation of student work and student grading (point 5.3)
4. learning resources and student support (point 5.4)
5. teachers' quality assurance (point 5.5)
6. scientific and research and professional activity (point 5.6)
7. mobility and international co-operation (point 5.7)
8. resources for educational, scientific and research, and professional activities (point 5.8)
9. administrative and technical resources (point 5.9)
10. the Faculty information system (point 5.10)
11. public relations and public activities (point 5.11).

Activities concerning area 1 are related to strategic and legal documents governing activity areas, in accordance with its mission and vision [[Faculty of Engineering and Technology Development Strategy \(2021 – 2031\)](#)] and Quality Assurance actions, harmonised at the University level ([University of Zagreb Quality Assurance System Ordinance](#), [University of Zagreb Quality Assurance Manual](#), [University of Zagreb Ordinance on Studying in Undergraduate and Graduate Study Programmes](#)), however respecting the specific nature of the Faculty.

The Quality Assurance System Ordinance defines the Faculty quality assurance system implementation bodies: [the Faculty Council](#), [Dean](#), and [the Quality Management Commission](#) (the Commission). The Commission is composed of five members, of whom five are teachers, Faculty secretary, and one member represents students. The Commission is appointed by [the Faculty Council's decision](#). In co-operation with the Dean, the Commission organises, co-ordinates, and undertakes evaluation measures and develops internal mechanisms of the Faculty quality assurance and improvement. Other Faculty commissions and co-ordinators also provide support to the Commission in conducting activities for the Faculty quality assurance and improvement.

The web page dedicated to Quality Assurance provides insight into:

- The Faculty Quality Assurance System underlying documentation
- Quality Assurance Action Plan for a given academic year ([Quality Assurance Action Plan of the constituent for the academic year 2020/2021](#)),
- Action Plan results of a given academic year ([Annual Quality Assurance Report of the constituent for the academic year 2020/2021](#), [Annual Self-analysis Report of the Faculty of Chemical Engineering and Technology of the University of Zagreb for the academic year 2020/2021](#)).

Reports and plans are regularly discussed and adopted at [the Faculty Council sessions](#), annually.

The continuity of the Quality Assurance System operations is manifested in Dean's Annual Reports ([2015/2016](#), [2016/2017](#), [2017/2018](#), [2018/2019](#), [2019/2020](#), [2020/2021](#)), regularly presented at the Faculty Council sessions. Dean's Annual Report contains indicators and analysis of the Higher Education Institution management, Quality Assurance management, study programmes, students, human resources, teaching and non-teaching staff, science, transfer of knowledge and technology, mobility, international co-operation, finance, facilities, and equipment.

The Faculty Quality Assurance System includes all internal and external stakeholders in the education process and in professional, scientific, and research activities. Internal stakeholders are students, teachers, associates, administrative, technical, and supporting staff, employed at the Faculty, whereas the external stakeholders are legal and natural persons connected to the fundamental mission and activities of the Faculty,

such as other educational institutions, institutes, economy, local and state administration, and students who have completed their studies at the Faculty.

Students evaluate the work of teachers, study programmes, and overall support at the Faculty through [student surveys](#), conducted at the end of the final year of undergraduate and graduate study programmes. Individual courses are evaluated through surveys at the end of the semester.

Assistants are evaluated every year, in accordance with the [Junior Researchers Evaluation Ordinance](#).

External stakeholders play a significant role because of their participation in the internship ([Ordinance on Compulsory Internship of Students of the Faculty of Chemical Engineering and Technology of the University of Zagreb](#)). Furthermore, they hold expert panels for students and the Faculty teachers and participate in students' scientific and research activities. The Faculty uses external stakeholders' satisfaction surveys on graduated students' competencies to implement recommendations and to remedy identified deficiencies. For the needs of external stakeholders (economic operators), the Faculty staff prepares studies, expert papers, and projects and concludes co-operation contracts or agreements. Students perform their activities at the Faculty through the Student Council and the [Student Section of the Croatian Society of Chemical Engineers \("HDKI"\)](#). The latter allows students to express their creativity and innovation and to acquire additional knowledge and skills. The Student section launched the professional magazine "[Reaktor ideja](#)" (Reactor of Ideas) and organises [numerous workshops and conferences](#). The Faculty also hosts the [Society of Graduated Engineers and Friends of Chemical and Technological Studies \("AMACIZ"\)](#) which serves as a link between the alumni and the Faculty. In co-operation with the [Croatian Society of Chemical Engineers \("HDKI"\)](#), the Faculty organises numerous conferences ([Meeting of Young Chemical Engineers](#), [Croatian Meeting of Chemists and Chemical Engineers](#), [Ružička Days](#)), workshops ([lifelong education](#)), and contributes to the work of the magazines [Chemistry in Industry](#) and [Chemical and Biochemical Engineering Quarterly](#), along with [numerous books and university textbooks](#).

[The 2015 Internal Quality Assurance System Assessment Report of the University of Zagreb](#) evaluated the compliance of the Faculty with the ESG 2015 ([Standards and Guidelines for Quality Assurance in the European Higher Education Area](#)). The analysis of the Quality Assurance Policy indicated maximum compliance in all points except for the inclusion of external stakeholders in Quality Assurance. The issue has been partially implemented and its further improvement has been evaluated. Considering a more efficient involvement of external stakeholders, the Faculty established on October 9, 2017, [the Faculty Economic Council](#) as an advisory body to assist in the improvement of the Faculty professional activities.

Quality Assurance Policy is implemented through the Strategy as a part of the Faculty strategic management, reflecting the relationship between scientific and professional work and learning and teaching performance. The Faculty Development Strategy Commission has thus far presented five-year strategies. [The Faculty Strategy for the period 2015 – 2020](#), adopted on February 24, 2015, has identified eight strategic objectives, most of which were achieved.

STRATEGIC OBJECTIVE 0: Relocate the Faculty to a new location of the Scientific University Campus in Borongaj.

STRATEGIC OBJECTIVE 1: Implement the adopted Faculty organisation.

STRATEGIC OBJECTIVE 2: Continuously analyse and optimise study programmes, in interaction with all stakeholders in the education system.

STRATEGIC OBJECTIVE 3: Raise the entry quality of undergraduate students.

STRATEGIC OBJECTIVE 4: Modernise the teaching process and thus improve its quality.

STRATEGIC OBJECTIVE 5: Confirm and improve indicators on professional, scientific, and research productivity.

STRATEGIC OBJECTIVE 6: Intensify the mobility and international co-operation.

STRATEGIC OBJECTIVE 7: Increase the financial autonomy.

The most important strategic activities and results of the previous five-year period are outlined below.

The Faculty relocation project to the Scientific University Campus in Borongaj has been delayed, which however holds not only for the Faculty, but for the most of the constituents that are planning to move to the same site, as well. The Faculty has completed all required preliminary tasks regarding its relocation. The pending status of the relocation project has affected the reorganisation of the Faculty, which would have been easier to implement at a new location. Furthermore, the two earthquakes affecting Zagreb in the subject period have further contributed to the missed implementation of the reorganisation.

From the interaction with various stakeholders (students, teachers, external stakeholders – economic operators) the need for a new study programme have risen, to encompass both chemical technology and environmental engineering. In fact, the new graduate programme in English, entitled [Chemical and Environmental Technology](#), has been accredited and conducted in partnership with the Faculty of Chemistry and Technology of the University of Split. The programme has been executed since the academic year 2019/2020 and it is entirely adjusted to foreign students.

One of the Faculty's key strategic objectives in the previous five-year period was to improve the quality of incoming undergraduate students. The entry quality has been primarily raised by introducing higher admission criteria, implemented by the [Faculty Council's Decision](#) (page 8-9). The Decision introduced, starting from the academic year 2019/2020, the high school graduation in chemistry as a mandatory admission requirement. The Faculty expects to increase the quality of graduated students through the increase of the quality of admitted students. The analysis of high school graduation scores (data available in the [Self-analysis for the academic year 2019/20](#), Table 2.1), shows an increase in their average grades from 2015 onwards. The analysis of the total score achieved at the high school graduation ([Record from the 248th ordinary session of the Faculty Council](#), page 10), shows that the average score in the academic year 2021/2022 amounted to 500 – 700 points, (depending on the study programme). However, the report does not provide data for the academic years 2018/2019 and 2019/2020, and because of the three-year study programme the impact of mandatory high school graduation in chemistry to the quality of entry students can only be evaluated in the upcoming years.

The Faculty endeavours to continuously modernise the teaching process and thus improve its quality. The study programmes are continuously improved and reviewed, and new compulsory and elective courses were introduced in undergraduate and graduate study programmes. The University of Zagreb Quality Board has recorded [minor changes and additions \(up to 20%\) in programmes](#) of study of the academic year 2019/2020, implemented *in virtu* of the Faculty Council Decision. As part of the project [CeSaR conducted at the Faculty of Chemical Engineering and Technology](#), the Faculty introduced internships in

graduate study programmes. Modern equipment was acquired, student workshops were designed, and the e-platform for internship application is underway, which will facilitate easier interaction between students and potential employers and the evaluation of the completed internship.

Furthermore, all Faculty courses have been promoted to the level 2 of e-learning. The Faculty is an institutional user of the E-learning Centre, and all courses are available in the system *Merlin*. Teachers were encouraged to participate in numerous workshops, debates, webinars, and conferences about e-learning and online assessments, which has ensured distance learning quality, which was important in the period of the pandemic. For the past three years, teachers have the possibility to apply for the Best e-course competition, in accordance with the [Best e-course Award Ordinance](#). The Faculty continues with the financial support for the preparation of university textbooks, endeavouring to enrich the volume of available teaching materials.

The Faculty holds prime position in the scientific productivity at a national level, but it still falls behind its related foreign institutions. Nevertheless, the [University of Zagreb announced that a research group from Stanford University in California \(USA\)](#), led by Professor John Ioannidis, recently published a [study on scientific quoting](#), mentioning two scientists from this Faculty.

The Strategy envisages leaping forward through a more intensive involvement in international scientific and research projects. The main supporter and advisory body for this activity was the International Co-operation Commission, led by the Vice Dean for Science and International Co-operation. The International Co-operation Office was established in 2018 and has ever since supported teachers and students in the implementation of international co-operation and mobility.

One of the strategic objectives of the previous period was to increase the Faculty's financial autonomy, which to a great extent depended on the Faculty's non-realised relocation to Campus Borongaj. Furthermore, two devastating earthquakes have increased the Faculty expenses. Income from undergraduate and graduate study programmes' tuition is defined by the Ministry of Science and Education and the amount can be scarcely influenced. The income could have been increased through a better-quality co-operation with the economy, which was partly included in strategic objective no. 5., but the earthquakes and the pandemic brought negative impact upon the economic situation in the Republic of Croatia and inevitably affected the Faculty. The Faculty is the founder of the spin-off company [Comprehensive Water Technology d.o.o. \(CWT\)](#). The purpose of CWT is to develop and strengthen the innovation role of the Faculty and to transfer knowledge from the Faculty to the economy, keeping in mind sustainable development. The Faculty (80% share) and the University of Zagreb (20% share) are the owners of the company. The largest target market are the operators of existing and developers of new equipment for purification of drinking water and wastewater, industrial water treatment facilities, and project companies operating in this area.

The strategy and strategic objectives are defined based on the SWOT analysis. For the upcoming period, the Faculty adopted a ten-year strategy ([the Strategy 2021 – 2031](#)). It presents the main advantages and disadvantages of the Faculty's potential in terms of programmes, personnel, and material, analysing their strengths, weaknesses, opportunities, and threats (the so-called SWOT analysis).

STRENGTHS

- tradition and experience
- competence of teachers and employees

- satisfactory equipment of the Faculty in comparison to the closer environment
- international studies in English
- partial self-sustainability
- developed academic entrepreneurship

WEAKNESSES

- insufficient staff and poor student involvement in the exercise of professional activities
- spatial and building inadequacy, appearance, and functionality of the Faculty workspace
- insufficient recognition of the Faculty at the national and international level
- insufficient interest of employees to apply for international scientific and professional projects

OPPORTUNITIES

- increasing public visibility by presenting operational excellence of the Faculty to a wider social community
- strengthening the competence of students and Ph.D. students by inclusion in the scientific and professional activities of the Faculty
- direct involvement of stakeholders from the economy into scientific and teaching process
- increasing the number of lifelong learning programmes
- including the experience of academic entrepreneurship and the innovation commercialisation in all levels of the Faculty activities

THREATS

- insufficient capacity in terms of facilities and employees
- inability to apply for projects because of unresolved property ownership status
- insufficient mobility and internationalization.

[The new strategy](#) identified nine strategic objectives of the Faculty:

STRATEGIC OBJECTIVE 1: Quality Management and Assurance – to improve continuously all processes and activities to ensure sustainable development of the Faculty.

STRATEGIC OBJECTIVE 2: International co-operation – to raise the level of global presence and create a significant international strategic partnership.

STRATEGIC OBJECTIVE 3: Resources – to increase the level of self-sustainability of the Faculty activities.

STRATEGIC OBJECTIVE 4: Teaching activities – to improve all levels of studies and support for students to increase their success, competitiveness in the labour market, and overall preparedness for contemporary challenges.

STRATEGIC OBJECTIVE 5: Scientific activity – to publish high-impact and innovative scientific works and conduct scientific research concerning local and regional challenges, but also those that will help improving the quality of life at a global level (green technologies, sustainable energy resources, industry 4.0, economic growth, health, and similar).

- STRATEGIC OBJECTIVE 6: Transfer of knowledge and technology – to integrate strongly scientific research, teaching, and transfer of knowledge and technologies for purposes of more intensive co-operation with the innovation-based economy and academic entrepreneurship.
- STRATEGIC OBJECTIVE 7: Green technologies – to drive the Faculty’s development toward green technologies which are based on modern digitalisation principles, industry 4.0, and clean energy, and on principles of circular economy and sustainable development.
- STRATEGIC OBJECTIVE 8: Digitisation – to introduce the concept of operational excellence into the Faculty’s business processes using digital transformation and strengthen the capacity needed to create digital innovations.
- STRATEGIC OBJECTIVE 9: Social responsibility – to create working conditions in which students and employees can act ethically, transparently, and sustainably, contributing to the social community and public good.

The Faculty Management, with the help of Dean and the Faculty Council operative bodies, continuously and systematically collects and analyses data on their business processes and resources and uses them to manage and improve their activities and the activities of the Faculty ([Quality Assurance Manual](#)). The information about the Faculty operations is the starting point for effective Quality Assurance. The Faculty has adopted methods for collecting and analysing data about its activities, gaining insight into strengths and weaknesses of its activities and areas that require special attention. The Faculty owns databases regarding classification procedures, students, academic staff, non-teaching staff, employment of graduated students, students’ satisfaction with study programmes, the Faculty inventory, and financial reports. The Faculty provides adequate resources necessary for a continuous improvement of the quality of educational, scientific and research, and professional activities ([Annual Quality Assurance Report of the Faculty](#)). The adequacy of resources depends on specific disciplines and differences between individual Faculty departments are being respected. Co-operation and agreement on certain available resources (laboratories, scientific equipment, and similar) is ensured at the Faculty level, to optimise their use.

Every month, one week before the Faculty Council session, the Dean meeting takes place, to ensure more efficient Quality Management. Aside from the Faculty management, the meeting is attended by the heads of departments. The meeting agenda refers to topics and work materials to be discussed at the Faculty Council session. Two weeks before the Faculty Council session, the Election Commission and the Faculty Development Strategy Commission organise their own meetings. In addition, administrative and professional departments of the Faculty also organise meetings to improve Quality Assurance Procedures.

The Faculty continuously analyses and optimises its study programmes in interaction with education system stakeholders and external stakeholders. The Vice Dean for Education meets the Faculty Education Commission once a month and analyses the implementation of study programmes, detects their deficiencies, proposes improvements and adjustments. From the academic year 2020/2021 student surveys are being conducted on the teaching workload compliance and the allocation of ECTS credits for each course.

The Faculty of Chemical Engineering and Technology of the University of Zagreb uses different methods to collect information on the quality of all its activities. The Faculty conducts a survey to evaluate teachers and assistants who participated in the execution of undergraduate and graduate study programmes. The assessment is conducted at the end of each semester, either online or in a traditional, “paper-pen” survey, in accordance with the circular survey plan and upon the invitation of the University. The results serve to assess the quality of teaching work and to provide teachers with information on the necessary adjustments and improvements. Student survey insight is personalised and accessible via teachers’ login on the [Teaching portal](#) at the platform ISVU. The average results of teaching staff surveys (at the Faculty level) for the academic years 2011/2012, 2014/2015, and 2017/2018 for [winter](#) and [summer](#) semester are available on the Faculty web pages. The Faculty teacher's average score (4.35) is comparable to the average teacher's score of the University (4.35).

Undergraduate students ([evaluation of undergraduate study programmes by students who completed their studies](#)) and graduate study programmes ([evaluation of graduate study programmes by students who completed their studies](#)) take the survey on the overall satisfaction of the study after their graduation. The survey assesses all segments of the study: the work of administrative and professional department, general conditions of study at the Higher Education Institution, study programmes (score relates to the study as a whole), teaching process, and knowledge evaluations (score relates to the study as a whole), treatment of students and support with the studies, and general outcome estimation. Furthermore, students can insert their comments and suggestions at the end of the survey. The survey contains 76 questions. [The survey conducted in the year 2019/2020](#) upon the completion of the graduate study, shows that most students were satisfied with the study programmes (average score of 3.80), teaching process and knowledge evaluation (average score of 3.75), treatment of students and support with the studies (average score of 3.66), and general outcome estimation (average score 3.45). In 43.6% of the survey responses, the graduate study was evaluated as very good and excellent in 27.1%.

The Faculty [undergraduate](#) and [graduate](#) students completed their surveys on teaching workload compliance and allocation of ECTS credits for the academic years 2019/2020 and 2020/2021. The results showed positive and negative deviations in individual courses. However, when evaluating results, it should be considered that teaching in these academic years was conducted in hybrid model, due to the pandemic, which may have affected the assessment of workload compliance. The Quality Assurance Commission deems the results only as an indication and has, therefore, proposed to conduct consultations with some of the teachers. In the event of a recurrence of non-compliance in the following surveys, the Commission will propose, in agreement with the teachers concerned, corrections of teaching content or the number of assigned ECTS credits.

The Faculty has conducted a satisfaction [survey among the Faculty employees](#) regarding the work of the Management, the Faculty Secretariat, and respective professional services. Furthermore, the Faculty endeavours to collect information about the early career development of its graduated students, especially regarding jobs and the time span before the first employment. The first survey was conducted in 2009 and has been held in regular three-year cycles since 2014. The results are presented on [the Faculty website](#) and through publicly available articles in the magazine “Kemija u industriji” (Chemistry in the industry), (surveys from [2014](#), [2017](#), and [2020](#)).

A survey among the employers has been conducted (see chapter II.3), as a part of the project TARGET – Establishment of higher education qualifications and occupations standards in mining, geology, and chemical technology sector, who assessed which

competencies are considered as important for a particular job and to what extent the Faculty graduates employed in their companies are lacking such competencies. The results showed a general satisfaction of employers with graduates who were mostly lacking practical industrial experience, critical thinking, and team leadership skills. In February 2021, another employers survey has been conducted as a part of the project CeSaR (see chapter II.3). The employers stated that students should be additionally educated by preparing industry-based graduation theses, through internships, specialised workshops, and increased hours of practical courses.

The Faculty is committed to the implementation of the Human Resources Management Policy aiming at their continuous development. Dean organises regular meetings with the Faculty Development Strategy Commission and discusses the Faculty personnel policy. The Faculty is continuously conducting balanced and co-ordinated human policy activities. For purposes of control and easier understanding of the situation, the workload of teachers and assistants is monitored on annual basis. For each academic year, the Faculty Council adopts the official Teaching workload. The execution plan for each academic year is proposed by departments and the Faculty Council adopts the [ECTS information package](#), along with the conclusions and, where appropriate, internal reallocation of staff (interdepartmental assistance). Considerable progress was made in the previous period in balancing the teaching workload among teachers, junior researchers, and assistants ([Annual Quality Assurance Report of the constituent](#), Dean's Reports for [2017/2018](#), [2018/2019](#), [2019/2020](#), [2020/2021](#)). Through the optimisation of the workload, the scientific potential of teachers and the ability to apply for new projects is enhanced, which positively affects the Faculty personnel resources in terms of recruiting new Ph.D. students as part of such projects.

The increase of study programmes volume (increased quota, new programmes) requires personnel policy adjustment prevalingly by the increase of teaching resources. Considering that the overall aggregate coefficient of the employees does not significantly change, a platform was designed and implemented allowing the Faculty to replace exiting assistants, senior assistants, and junior researchers with new assistants or assistant professors, ensuring the difference in the coefficient. When hiring an assistant professor, the Faculty takes into consideration the policy of teachers advancement to the rank of associate professor, full professor, or full professor with tenure. Before 2020, the Faculty arranged with the University and the Ministry of Science and Education the consent for advancement, and after that, the advancement salary coefficients are ensured from coefficients released at the employee exit. The Faculty endeavours to manage the potential of non-teaching staff with quality. Thus, the Faculty administrative, professional, and technical staff participated in the period from January 1, 2018, until December 31, 2020, in 29 workshops and webinars.

I.2 The Higher Education Institution applies quality improvement recommendations from previous assessments

The Higher Education Institution has implemented improvement recommendations and conducts activities based on the previous assessments (internal and external).

The Higher Education Institution analyses improvements and uses them for further development planning.

The Agency for Science and Higher Education (AZVO) conducted the reaccreditation procedure of the Faculty in 2015, evaluating five of seven Faculty standards (no. 1, 2, 4, 6, and 7) as “prevalingly implemented” and two standards (no. 3 and 5) as “fully implemented”. **The Faculty has implemented improvement recommendations and has undertaken the**

following activities based on the above assessments of “previously implemented” standards:

- The Faculty continuously worked on the harmonisation of the Faculty documents with the University documents and on the update of Faculty [ordinances](#) and has adjusted [the Faculty Statute](#). The above reflects the adoption of recommendations related to Standard no. 1.
- The fragmentation and broadness of the postgraduate study programme were reduced in Standard no. 2. More external stakeholders from the economy sector were included in study programmes, whether through lectures (e.g., prof. Ernest Meštrović from Xellia Pharmaceuticals is a co-owner of the course Innovation-based Enterprise), or through professional visits to companies (e.g., visits to the facilities of INA-Industrija nafte d.d., PLIVA Hrvatska d.o.o., and Tehnix d.o.o.). Furthermore, the external stakeholders have been mentoring students at their internships, mentoring or co-mentoring their graduation theses (in the economy and in institutes), and participating in scientific boards for the evaluation of such theses.
- Through the International Co-operation Office (since 2017), teachers were more actively encouraged to embrace the mobility, which resulted in the mobility of 26 teachers and associates (2015 – 2019), satisfying thus the requirements set in Standard no. 4.
- The recommendations for Standard no. 6 aimed at the increase of attractiveness of the Faculty, i.e., to attract foreign students and teachers. The Faculty has enhanced the mobility indicators by active engagement in the programme Erasmus+ (47 students since 2015). Furthermore, a graduate study entitled Chemical and Environmental Technology was introduced, conducted in English and open to foreign students. A bilateral agreement was signed with the higher education institution Institut textile et chimique de Lyon for the execution of one semester, organised in English language for Lyon students in Zagreb (140 students throughout four academic years). As a part of the program The University of post-industrial cities (UNIC), the Faculty offered online courses in English language to facilitate international mobility. In parallel, approximately 30 teachers and associates visited the Faculty in the period from 2015 to 2021, on various grounds. One part participated in regular courses lectures (e.g., prof. Ana Cristina Diniz Vicente Pardal, as visiting teacher at the course Environment Impact Assessment), one part (14 teachers and associates) held their lectures as a part of the AMACIZ colloquia series, whereas one part participated in scientific work and practical support to students with exercises and preparation of the graduate theses.
- The recommendations for the improvement of Standard no. 7 envisaged professional training to non-teaching staff and improvement of resources and facilities to the highest international standards. The Faculty has continuously invested in the development of non-teaching staff. Members of the accounting department participate in approximately ten training sessions per year (for example, the seminar Introduction to the Use of EU Funds). The employees from the International Co-operation Office participate in at least two trainings per year (e.g., the training cycle on the internationalisation of higher education – Certain Aspects of Internationalisation of Higher Education: Attracting Foreign Students). Employees from the Dean’s office also participate in professional training (e.g., training on public procurement). Considerable progress was made in resource improvement, especially regarding the equipment where the Faculty has, in the past two years, acquired or is in process of acquiring, the equipment of 20 million kuna value.

In 2018, the Agency for Science and Higher Education has conducted another external evaluation, with the purpose of reaccreditation of the doctoral study programme Chemical Engineering and Applied Chemistry (“KIPK”). The report contained the assessment of the quality of 34 study items, of which 27 received “high-quality level” score, whereas for seven items the assessment score was “improvements are required” (points 1.2, 1.6, 2.5, 3.10, 4.1, 4.4, and 4.8). In May 2019, the Faculty drafted [the Action plan for improving the quality of the doctoral study programme Chemical Engineering and Applied Chemistry](#) to implement recommended improvements.

- [In points 1.2 and 4.1](#) the total number of courses was reduced by 20%, merging courses of similar nature. Furthermore, from the academic year 2019/2020 a so-called research study model was introduced on the example of three students, by which ECTS credits could be obtained through research-oriented workshops, lectures, or summer schools organised within the European project MSCA-ITN-EJD, from Horizon 2020. Other students have also obtained ECTS credits for summer schools and workshops organised by the Faculty (e.g., How to publish your article in a research journal?), national institutions (e.g., Project [TARGET – Establishment of higher education qualifications and occupations standards in mining, geology, and chemical technology sector](#)), or international institutions (e.g., Horizon 2020 proposal development training course, Short Summer School on Thermal Analysis and Calorimetry). Eleven new teachers have been employed since the accreditation, reducing thus the total workload indicator and enabling more extensive teaching engagement at the doctoral study programme.
- Regarding point 4.4, only one doctoral dissertation was defended before the accreditation commission's visit to the doctoral study programme Chemical Engineering and Applied Chemistry. This number has thus far increased to over 30, and along with the old doctoral study programme, to more than 80 doctoral dissertations have been defended since 2015. A distinct compliance check now is easier to make, comparing the doctoral study programme Chemical Engineering and Applied Chemistry with a set of learning outcomes of the Croatian Qualifications Framework, which foresees at least three years of full-time scientific or artistic research, resulting in original doctoral dissertations with a relevant international review.
- Regarding point 2.5, the recommendations envisaged the increase of the number of doctoral dissertations in English. The Faculty has thus adopted [Guidelines for writing doctoral dissertation in English, according to the Scandinavian model](#). The recommendation to acquire software for thesis authentication verification was resolved at a national level by purchasing the [PlagScan](#) system. Furthermore, the Faculty organises once a year a soft skills workshop for Ph.D. students, where they gain knowledge about ethical behaviour in scientific research.
- Regarding point 1.6, it was recommended to increase the accessibility of scientific literature and to acquire new equipment. As previously indicated, the Faculty has since 2015 acquired or is in process of acquiring the equipment of 20 million kuna value and the availability of literature has been increased prevalingly through the national level contracts.
- Regarding points 3.10 and 4.8, the recommendation advised more extensive internationalisation of study programmes and the increase in the number of projects and resources, which would facilitate doctoral students to disseminate their scientific results. In the previous period, the Faculty has significantly [increased the number of projects](#), including international projects, and consequently increased the available funds for the publication of papers. Furthermore, the Faculty is engaged in efforts to

reduce fees for doctoral students' attendance at international conferences. The Faculty regularly advertises national calls for applications (Erasmus+) or calls for application for academic mobility at the University of Zagreb, aiming to increase the international student mobility.

The Faculty regularly analyses the Quality Assurance status from Dean's Annual Reports ([2015/2016](#), [2016/2017](#), [2017/2018](#), [2018/2019](#), [2019/2020](#), [2020/2021](#)), Annual Quality Assurance Reports of the Constituent ([2015/2016](#), [2016/2017](#), [2017/2018](#), [2018/2019](#), [2019/2020](#)) and uses them for further development planning under the Quality Assurance Action Plan of the Constituent ([2016/2017](#), [2017/2018](#), [2018/2019](#), [2019/2020](#), [2020/2021](#)). These documents demonstrate that students regularly evaluate their completed undergraduate and graduate study programmes. The results are used for study programme development planning, review of the execution plans and programmes and learning outcomes, improvement of courses in English language, and remote teaching. The above resulted in a steady increase in the average study score, and the Faculty therefore plans to continue to operate in this way. Regarding the doctoral study programme, the economic crisis from 2008 to 2013 resulted in a decrease of interest and a reduction in the number of admitted students. The Faculty, therefore, established the International Co-operation Office, encouraging employees to apply for scientific projects. Furthermore, the Faculty included advisory companies to assist with the preparation of projects. As a result of the increased number of applied and approved projects, new equipment was acquired, scientific activities were intensified, and new doctoral students were hired. Therefore, the Faculty intends to continue operating in the same direction.

I.3 The Higher Education Institution supports academic integrity and freedom and prevents all forms of non-ethical behaviour, intolerance, and discrimination

The Higher Education Institution supports academic integrity and freedom, ensuring the ethics of research and preserving academic integrity and freedom.

The Higher Education Institution used efficient mechanisms of prevention of non-ethical behaviour, intolerance, and discrimination.

The Higher Education Institution implements measures to sanction non-ethical behaviour, intolerance, and discrimination.

The authority system for conflict resolution and irregularities operates at all levels of the Higher Education Institution.

Employees, students, and external stakeholders of the Higher Education Institution base their work on the principles of academic ethics.

The Higher Education Institution systematically addresses copying and falsifying results, and plagiarism.

The Faculty applies fundamental moral principles and principles of professional ethics, ensures the research ethics, preserves academic integrity and freedom, and prevents non-ethical behaviour, intolerance, and discrimination through the application of the following documents:

- [The University of Zagreb Code of Ethics](#) – the compliance with this document is mandatory for teachers, scientists, and other Faculty employees in their professional and public activities. The Code of Ethics principles appropriately apply to students and non-Faculty employees. The Code of Ethics preserves the dignity and reputation of the Faculty, but also of the University of Zagreb, while respecting the principles of scientific creativity freedom. According to the Code of Ethics, the Faculty has the obligation to address unacceptable behaviour, including the following areas: discrimination,

harassment, prejudice, professional duties in teaching, unacceptable teaching practices, inventing results, falsifying, plagiarism, inventing, and correcting recommendations, receiving gifts and other benefits, conflict of interest, transparency and confidentiality, right and duty of a continuous training and lifelong learning, professional advancement, public performance, and accountability towards the university community.

- [The Student Disciplinary Responsibility Ordinance](#) – this document regulates types of student disciplinary actions and measures and defines the procedure for disciplinary proceedings. In accordance with this Ordinance, disciplinary proceedings against students are decided by [the Student Disciplinary Responsibility Commission](#) which conducts the procedure and issues disciplinary measures as defined by the Ordinance.
- [The Labour Ordinance](#) – this document, in the part Employment Rights and Obligations, defines mechanisms for the protection of employees' dignity and against discrimination at work, including the selection criteria and requirements for employment, promotion, professional guidance, professional and other training, in line with special laws. The above-indicated discrimination is prohibited on the basis of racial or ethnic origin or colour of the skin, sex, language, religion, political or other belief, national or social origin, wealth, union membership, education, social status, marital or family status, age, health, disability, genetic inheritance, gender identity, expression, or sexual orientation.

The Ethics Commission was established, as prescribed by the University of Zagreb Code of Ethics, as a permanent professional body of the Faculty Council, with a two-year mandate, ensuring compliance with the University Code of Ethics. The Faculty Ethics Commission consists of three teachers, one representative of assistants or doctoral students, and one representative of undergraduate or graduate students. The Commission acts upon need, based on its own knowledge or information obtained about the non-ethical behaviour, which can be reported anonymously on [the web page of the Faculty](#) or of [the University](#).

The Faculty follows European and global standards in the employment process, aiming at the selection of the best scientific staff. All tenders for assistants and junior researchers are publicly and internationally available, in accordance with article 108 of the Labour Ordinance. The behaviour of employees qualified as harassment or sexual harassment represents the breach of employment obligations and may lead to the termination of the employment agreement (article 109 of the Labour Ordinance). The Faculty employees' submissions are directed toward [the Employees Dignity Protection Commissioner](#) appointed by the Faculty Dean (article 110 of the Labour Ordinance) for a two-year mandate. The Commissioner has the obligation to react within eight days upon the reception of the written or verbal report, collecting appropriate evidence to determine the facts. All actions are registered as records or notes on further proceedings, as described in detail in articles 111 to 117 of the Labour Ordinance.

In addition to the above, students may indicate the inappropriate behaviour in their surveys, whose results are being analysed. In the event of a non-ethical conduct of a teacher, the Quality Management Commission shall inform the Vice Dean for Education and the Ethics Commission about such incident.

The Faculty systematically addresses issues of copying and falsification of the results and plagiarism, through the [PlagScan](#) software for the verification of the authenticity of seminars, undergraduate and graduate theses and doctoral dissertations. It is possible to conduct the unlimited number of verifications for every enrolled student. Teachers, students, and non-Faculty employees can perform the verification, in accordance with the procedures and needs of the Higher Education Institution. The PlagScan software is accessed

through the AAI @EduHr electronic identity login. Furthermore, the mentor, as a responsible person, verifies the scientific results of the undergraduate and graduate theses and doctoral dissertations. The papers are subsequently submitted to the members of the defence committee for review and all defences are public. All students applying for their undergraduate or graduate thesis must complete [the Statement](#) with the following content: "I declare, under full material and moral responsibility, that I have autonomously created this work and that it does not contain any copied parts of other people's works, without having them properly marked as a citation, indicating their source." The Council of the doctoral study programme Chemical Engineering and Applied Chemistry is in charge of taking care about the ethics in research, taking into consideration possible non-ethical conduct during the approval of doctoral dissertations.

Each academic year, all members of the Faculty complete [the Statement of \(non\) existence of a conflict of interest](#), in accordance with article 80 of the Public Procurement Act, preventing the conflict of interest of the Faculty employees in business relationships with other business subjects.

In the previous five-year period, the Student Disciplinary Responsibility Commission, the Faculty Management, and the Faculty Council have processed several cases of inappropriate and non-ethical conduct of students. Thus, in 2015, three students were sanctioned for inappropriate behaviour (cheating in the exam). Against two students, a written warning was issued, and the warning with the threat of expulsion against one student. In 2016, a written warning with the threat of expulsion was issued against a student for disorderly conduct and recurring action, whereas one student was expelled from the study after repeatedly inappropriate behaviour and severe breach of order and rules established for certain classes. In 2019, against one student a warning was issued for copying, and two students were banned from the exam session because of non-permitted use of a cell phone during an exam. All procedures against students were attended by the Student Ombudsman elected by the Student Council and the information on the proceedings against the above-mentioned students was recorded in the diploma supplement.

Disciplinary proceedings were conducted against the Faculty employees as well. In 2018, a warning was issued to an employee for frequent violations of employment obligations (arriving at work in an alcoholic state) and the employee had to take an extraordinary medical examination. In 2021, a warning was issued to an employee for conduct that threatened the reputation of the Faculty. In the same year, one employee was reported for inappropriate behaviour toward her by another employee. The incident has been resolved peacefully and with an apology from the employee.

I.4 The Higher Education Institution ensures the accessibility of information on important aspects of its activities (teaching, scientific, artistic, and social role)

Information on study programmes and other Higher Education Institution activities is publicly available in Croatian and one of the world languages.

The Higher Education Institution informs the public about the admission criteria and quotas, study programmes, learning outcomes and qualifications, and forms of support available to students.

Information on the social role of the Higher Education Institution is available to the public.

The Higher Education Institution informs the public about other indicators (e.g., analysis of the passing quota, recruitment of graduated students, withdrawal rates, previous evaluation outcomes, and similar).

Through its official [website](#), the Faculty provides to students and other stakeholders detailed and up-to-date information about its activities, in Croatian and [English](#). The

website, therefore, contains basic information on the Institution, fundamental legal documents such as the [Statute](#) or the [Studies Ordinance, information on the organisation and employees](#), information on [study programmes](#), [scientific activity](#), and [international co-operation](#). Future students can familiarise themselves with the Faculty's study programmes and gain other information as follows:

- At the homepage the Faculty website, in the [Students Guide](#) and the brochure “[Studirati na FKIT-u](#)” (Studying at the Faculty of Chemical Engineering and Technology)
- At the page [Curricula](#), containing links to each study programme and the [ECTS information package](#), with detailed information about all undergraduate and graduate study programmes and the courses, including learning outcomes at the programme level and at the course level, the number of ECTS credits, the course execution programme and schedule. The links contain information on the admission quotas, qualifications and competencies acquired at the completion of study programmes, study regime, and possibilities for further education and employment
- At the [Faculty Facebook page](#)
- At the [University of Zagreb Fair](#) where in recent years the Faculty received [awards](#) for the best [stand or promotional material](#)
- At the Open-Door Days, organised each year in February, presenting study programmes and scientific research, equipment, and laboratories of individual departments
- Through direct inquiries via telephone or e-mail, addressed by the employees of the Admissions Office or Vice Dean for Education.

At the link, [students](#) may find information on scholarships tenders, student application forms, contact details of the co-ordinator for support to students and co-ordinators for students with disabilities, student representatives, student activities, projects and associations, and similar.

The Faculty continuously develops its promotional system to emphasize its presence in the society and to build recognition and a good public image. The information on the Faculty's social role is available to the public at the Faculty's website where the [results of the Faculty activities](#) are presented, integrating Faculty activities into social areas. The Faculty is actively working on its position in society to efficiently promote its values, which are of paramount importance to society. This [link](#) contains news about social activities of the Faculty, such as the attendance of teachers and students on TV shows, press releases about the Faculty, announcements about signed research, development, and education projects contracts with the industry, and the participation of the Faculty in science promotion activities, such as the Science Festival.

Furthermore, the Faculty actively supports the activities of the [Student Council](#) at the Faculty, along with various students' projects. Projects outcomes and student successes in sports and scientific competitions are regularly published on the Faculty website.

The Faculty web pages contain documents and information about [the Quality Assurance System](#), such as quality assurance system annual reports and action plans, the Faculty self-analysis, starting from the year 2008, a [competent ministry certificate](#) on fulfilment of conditions for the execution of doctoral and specialist study programmes, Agency for Science and Higher Education documents, such as the [accreditation recommendations and the quality assessments](#). The Faculty monitors the early career development of its graduated students through a survey conducted every three years, as defined within the Quality Assurance System and using the form prescribed in 2015 by the

Quality Assurance Manual. A survey related to the Faculty Project CeSaR is described in Section II.3. Pursuant to the Information Access Act, any additional, and potentially undisclosed information can be accessed through a web page containing all forms related to the process of exercising the right to [access the information](#).

I.5 The Higher Education Institution understands and encourages its social role development

The Higher Education Institution contributes to the development of the economy (economic and technological mission of the Faculty)

The Higher Education Institution contributes to the development of the local community.

The Higher Education Institution contributes to fundamentals of the academic profession and the responsibility of university teachers for the development of universities and local communities.

Social role development is part of the Higher Education Institution mission (e.g., civil society development, democracy, and similar).

The Faculty contributes to technological, economic, and social development in line with the strategic needs of the Republic of Croatia and according to the mission of the University of Zagreb. A selection of such activities is indicated below:

- The Faculty drives its scientific activities towards the increase of research, development, and innovation capacity (“IRI”) and state-of-the-art scientific research that meets the needs of the economy. These efforts are shown in [development and innovation projects](#), funded by the European Structural and Investment Funds and the Croatian Agency for SMEs, Innovations and Investments, from 2015 to date, presenting a positive impact on the education of undergraduate, graduate, and postgraduate students and young scientists, who, through mentoring exercises, project tasks, and the preparation of undergraduate and graduate theses and doctoral dissertations, join in research activities and acquire knowledge and skills, strengthening their competitiveness on the labour market. The market-oriented competencies of young engineers and researchers facilitate their transition and integration into the economic sector, contributing to its development momentum.
- Teachers and Faculty researchers transfer knowledge to the economy when mentoring doctoral dissertations in topics related to the development of industrial areas and economic operators (Pliva, INA, Končar...).
- The Faculty’s focus on the needs of the economy is also reflected in the intensification of its engagement in student internships, prevailing under the project CeSaR, financed by the European Social Fund (UP.03.1.1.04.0026; 9.3.2020 - 9.3.2023). The project aims to improve students’ practical and soft skills and to strengthen the co-operation with employers by establishing the Advisory and Students’ Career Development Centre ([CeSaR](#)). The project introduced Internship as a new course in graduate study programmes and set up training facilities with modern equipment.
- The Faculty is open to different forms of co-operation with the economy, including leading and the execution of professional projects for the economy purposes and direct co-operation with economic operators on their projects, where the contribution to the development of specific technologies, brings wider benefits to the society, economy, and the environment as a whole.

- The transfer of knowledge and technology is conducted in [a commercially responsible manner](#), as shown by the revenue generated through the co-operation with numerous public and private business partners.
- The Faculty facilitates the connection between the economy, the academic community, and job creation through academic entrepreneurship, as manifested by the founding of the spin-off company [Comprehensive Water Technology \(CWT\)](#) in 2015, which operates under the joint ownership of the Faculty and the University of Zagreb. The activity of CWT prevalingly relates to the treatment of drinking water and wastewater, as well as the development of new technologies, design, monitoring, and commissioning of water treatment plants, analytical water quality testing, and the production of studies and documentation in the area of water management.
- The Faculty creates new initiatives aimed at developing the economy, and endeavours to include all key stakeholders from the public and real sectors. Upon the identification and definition of a problem, a concept design is jointly developed, followed by technological development. The Faculty and the Croatian Chamber of Commerce initiated and launched, in co-operation with the Environmental Protection and Energy Efficiency Fund and the Union of Croatian Innovators, [the Fair of Ideas](#), an arena for meeting and driving active partnership of scientific community and the economy. The Student section of the Croatian Society of Chemical Engineers participates at the fair since 2018, strengthening the reach of this valuable Faculty initiative.
- The Faculty recognised the importance of transferring research, accumulated knowledge, and expertise from interdisciplinary areas of technical science to innovation, which represents a key element of development and economic competitiveness. In 2019, the [Intellectual Property Policy was adopted](#), and in 2020 a Commission for Innovations was established, considering the Faculty role of developing, encouraging, promoting, and supporting innovation. In co-operation with Association of Zagreb Innovators, the Faculty's innovations were since 2015 presented at numerous exhibitions and fairs, and awarded with 26 medals (10 gold, 15 silver, and one bronze). The Faculty has been an active member of the Union of Croatian Innovators since 2020.

The Faculty participates in the development of the local community by participating in science popularisation events and through publishing activities, connecting them to teaching. Among the science popularisation events, particularly interesting are the [European Researchers' Night](#) and [Science Festivals](#), at which the Faculty regularly participates since 2015. This year's theme was the Culture of science, a topic that inspired many participants. The Faculty attended with six lectures: Chemistry in high school graduation: YES or NO?; Bacteria Cultures in Fight for Sustainable Development; Biopolymer Chitin/Chitosan – New Materials in Everyday Use; A Sunny Path to Green Hydrogen, How to Protect the Environment with Chemistry?; and A Drop of Life, and with eight workshops: The Science of Chocolate; Millionaire/Alias/Chase/Pictionary with the Sound of Tamburica; Chemistry of Colours – Become a PJ Mask; The Amazing World of Materials; The Magic World of Microorganisms, The Culture of a Molecule; The Colours of Engineering; Chemistry in Culture. Furthermore, the Faculty organises [Open-Door Days](#) each February, aiming at the popularisation of STEM areas and of their scientific and educational programmes to primary and high school students, and to the general public. The publishing activity is an important segment of the Faculty's activities, which contributes to the development of the economy, community, and society. In the period from 2015 to 2020, Faculty teachers published eight textbooks, five monographs, and three books, where the Faculty was the publisher or co-publisher of 11 of them.

The Faculty can act outside the strict academic frameworks to support the local or wider community. For example, the Faculty provided some of the equipment and infrastructure for [the fashion show](#) that took place at the square outside the Faculty facilities, Marulićev trg. In addition, the activities of the [art section of the society AMACIZ](#), whose artwork is regularly exhibited at the Faculty Council, and at the rehearsals of the [AMACIZ choir “Vladimir Prelog”](#) are held at the premises of the Faculty.

One of the Faculty’s missions is the development of its social role, which includes voluntary contribution. For example, the Faculty is a partner of the Association “Pozor” and participates in the promotion of environmental protection and sustainable development and in the increase of the education quality, focusing particularly on lifelong learning. Aside from this, the Faculty promotes scientific and critical thinking among primary and secondary school students through the design and implementation of innovative chemistry and STEM programmes. The Faculty and the Red Cross of the City of Zagreb jointly implement the project STEM School in the Nature where teachers and Faculty students volunteer at the STEM workshops for primary school third-grade students in Zagreb. The volunteering of the Faculty employees and students at workshops was made possible by the project UP.04.2.1.10 [The Science Formula](#).

I.6. Lifelong learning programmes executed at the Higher Education Institution are compliant to strategic objectives and the mission of the Higher Education Institution and to the needs of the society

The Higher Education Institution demonstrates compliance of lifelong learning programme general objectives with the mission and strategic objectives of the Higher Education Institution.

The Higher Education Institution demonstrates compliance of lifelong learning programme general objectives with the needs of the society.

Lifelong learning programmes are being systematically and regularly reviewed and developed.

A lifelong education is organised learning, and for the engineering professions such learning is easiest to organise with a Chamber of Certified Engineers. Unfortunately, such a chamber does not exist for chemical engineering and in Croatia this profession is not regulated. Regardless of such circumstances, the Faculty has established prerequisites for a lifelong education system, which reflect the economy and employers’ needs. In the document [Faculty of Chemical Engineering and Technology Development Strategy \(2021 – 2031\)](#), in part concerning internal strategic objectives (objective C4), lifelong education is included through the measure M4, point 6: To improve lifelong education and development.

Different forms of lifelong learning and education have regularly been executed at the Faculty, such as workshops, seminars, lectures, and similar, which appear to be of interest for the economy and the labour market ([Table 1.1](#)). These programmes are implemented mainly without ECTS credits because there is no professional association that would formally require them. Nevertheless, the chemical engineering profession needs to gain and improve knowledge, skills, and abilities, focusing particularly on the following areas: material characterization techniques, pharmaceutical technology, instrumental analytical methods, environmental protection, biotechnology and biocatalytic processes, intellectual property, and similar. In 2018, the [Lifelong Education Ordinance](#) was adopted, defining the content framework, training forms, and implementation methods. The Ordinance prescribes the duty of the head of programme to conduct the evaluation of the programme upon its completion, using the [assessment form](#), and to inform the Faculty Council in writing about the execution of the programme. All workshops and seminars are conducted in accordance with the Ordinance.

According to the [Strategy](#), the Faculty participates in the organisation of new lifelong learning programmes that meet the needs of the wider community, particularly the business sector, and increases the execution frequency of the existing programmes ([Table 1.1](#)). The Lifelong Education Programme has its dedicated [website](#), where all workshops and seminars organised at the Faculty, in co-operation with the Croatian Society of Chemical Engineers, are advertised. All Lifelong Education Programmes are in line with teaching and research competencies and represent an important part of the Faculty's social role. The Faculty continuously endeavours to improve teachers' knowledge, skills, and competencies, driving them toward the concept of lifelong learning.

As part of the Faculty of Chemical Engineering and Technology project CeSaR and development of the [Advisory and Students' Career Development Centre](#) (UP.03.1.1.04.0026, 2020 – 2023), external experts held a series of workshops and lectures for teachers, non-teaching staff, and students ([Table 1.1](#)). Approximately 30 teachers and associates of the Faculty attended the training programme.

As part of the project [Chemical and Environmental Technology, the graduate study programme in English](#) (UP.03.1.1.02.0001, 2018 – 2021), workshops were organised for teaching staff, with the purpose of improving their English language skills. The programme is intended for students from the Republic of Croatia and foreign students, and it has been adjusted to labour market needs. Thus far, in the Republic of Croatia did not exist graduate study programmes in English which would prepare environmental experts for the growing needs of the labour market and the international co-operation. The study programme prepares students to be more competitive and to find employment in an international environment more easily. Foreign teachers are also participating in the execution of the programme, bringing an additional international character to the project. Through the execution of this project and the interaction with foreign students and visiting lecturers, the Faculty teachers will gain valuable additional experience.

II Study programmes

The Faculty of Chemical Engineering and Technology of the University of Zagreb conducts four university undergraduate study programmes: [Chemical Engineering](#); [Material Science and Engineering](#); [Environmental Engineering](#); and [Applied Chemistry](#), four university graduate study programmes: [Chemical Engineering](#); [Material Science and Engineering](#); [Environmental Engineering](#), and [Applied Chemistry](#); one postgraduate specialist study programme ([Petroleum and Petrochemical Engineering](#)), and one postgraduate doctoral study programme ([Chemical Engineering and Applied Chemistry](#)).

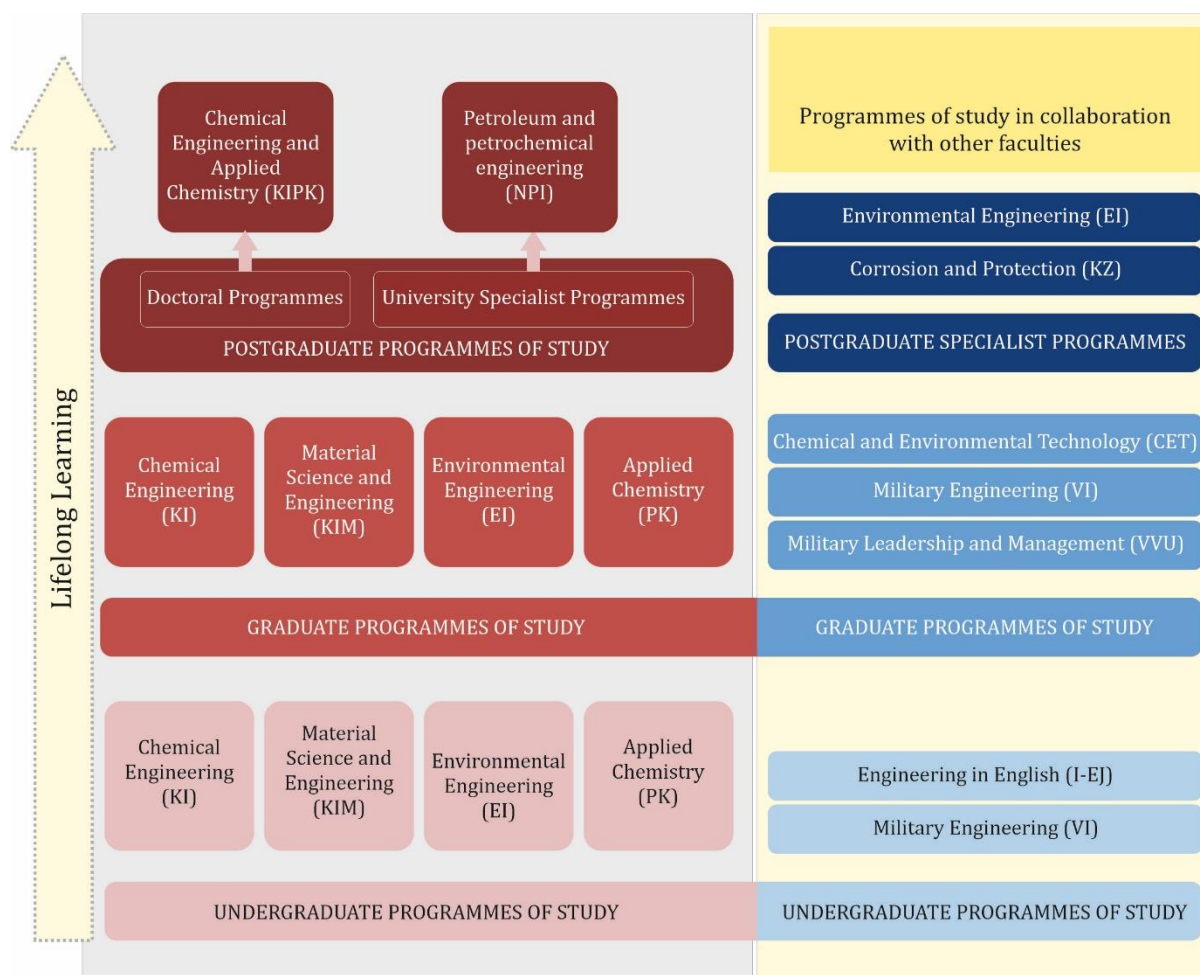


Figure II.1 Study programmes at the Faculty of Chemical Engineering and Technology

Study programmes (Figure II.1) are structured based on the tradition of previous study programmes and social needs and are comparable to similar study programmes in Europe and globally, aiming at the education excellence provided by the Faculty. Undergraduate and graduate study programmes Chemical Engineering, Material Science and Engineering, and Environmental Engineering pertain to the field of technical science, whereas Applied Chemistry pertains to the field of natural sciences. Undergraduate study programme **Chemical Engineering** is a direct continuation of the chemical engineering education tradition, a basis of the Faculty, enriched by new knowledge and technologies and close co-operation with the economy. The undergraduate study programme **Material Science and Engineering** relies on the scientific excellence of the Faculty in the field of materials, and the increasing development and application of advanced, nanostructured

materials in all areas of life and economy. The study programme **Environmental Engineering** is designed based on a growing need for highly educated experts in the field of environmental protection and sustainable development. The undergraduate study programme **Applied Chemistry** relies on traditional excellent chemistry education and provided top experts in organic and analytical chemistry who significantly contributed to the development of the pharmaceutical industry in Croatia.

All undergraduate study programmes follow their natural course into graduate programmes of the same title and where the knowledge and competencies acquired during the first three years of the study are further extended through visits to economic subjects and participation in Faculty teachers' scientific research. The Faculty graduate study programmes are open also to students from other higher education institutions, graduated in related studies, by taking supplementary courses or years. Such a structure of undergraduate and graduate study programmes endeavours to provide high-quality education with better employment opportunities, in line with the needs of society and economy that seeks experts of specific and broad knowledge in the field of chemical engineering and related disciplines. For all undergraduate and graduate study programmes, the Faculty possesses valid [authorisations](#).

Previous postgraduate doctoral studies **Chemical Engineering** and **Engineering Chemistry** were combined since the academic year 2014/2015 to form the postgraduate doctoral study programme [Chemical Engineering and Applied Chemistry](#), pertaining to the fields of technical and natural sciences and which allows for further education in all areas covered by the Faculty's undergraduate and graduate study programmes. The postgraduate specialist study programme [Petroleum and Petrochemical Engineering](#) (NPI) has not been conducted for several years due to low interest.

The Faculty applied for the financing offered in the Call for internationalization of higher education (European Social Fund — Operational program Effective Human Resources 2014 – 2020) and obtained the funds for the project [Chemical and Environmental Technology, the graduate study programme in English](#). The programme obtained accreditation and was entered in the [Register of Study Programmes](#). The execution is conducted in partnership with the Faculty of Chemistry and Technology of the University of Split since the academic year 2019/2020. From the academic year 2021/2022 onwards, the programme is executed as the Faculty's regular graduate study programme in the English language for which admission quotas are approved.

The Faculty participates in the execution of the university undergraduate study programme **Military Engineering**, together with ten other constituents from the University of Zagreb. With six other constituents from the University of Zagreb, the Faculty participates in graduate university study programmes **Military Engineering** and **Military Leadership and Management**, as well as in the undergraduate study programme **Engineering in English**, which, however, was accredited but remained inactive to date. All these study programmes are carried out by the University of Zagreb and therefore they are not the subject of this Self-analysis.

The Faculty is the co-ordinator of two university interdisciplinary postgraduate specialist study programmes: the [Environmental Engineering](#), participating in the teaching process along with 12 other institutions (of which eight are constituents of the University of Zagreb); and [Corrosion and Protection](#), participating in the teaching process together with four other constituents of the University of Zagreb. In the academic year 2020/2021, from the above indicated university specialist study programmes, only Environmental Engineering was executed. Aside from these undergraduate, graduate,

postgraduate, and specialist study programmes, the Faculty has been intensively working on lifelong learning programmes outlined and described in Chapter I.6.

II.1 General objectives of all study programmes are compliant with the mission and strategic objectives of the Higher Education Institution and social needs

The Higher Education Institution demonstrates the compliance of general objectives of all study programmes with the mission and strategic objectives of the Higher Education Institution.

The execution of study programmes is justified by social and economic needs and the analysis of the required capacity of the ability of the Higher Education Institution to execute such programmes.

When conducting study programmes that lead to regulated professions, the Higher Education Institution respects the recommendations of professional licensing organisations.

Higher Education Institution educates experts competitive in national and international labour markets.

The general objectives of all study programmes are defined in the [University of Zagreb Studying Strategy \(2014 – 2025\)](#), which establishes the following strategic objectives:

1. Driving modern study programmes toward the development of a broad spectrum of competencies
2. Fostering creativity, innovation, and motivating learning environment
3. Driving education and activities toward the development of the economy, society, and culture.

The above objectives are compliant with the mission and strategic objectives of the Faculty defined by the [Faculty of Chemical Engineering and Technology Development Strategy \(2021 – 2031\)](#) where the study programmes are covered by the strategic objective C4: To improve all levels of study programmes and support to students to increase their success and competitiveness on the labour market and overall readiness to respond to the modern challenges. Based on this strategic objective the following measures were determined:

1. To continuously improve teaching content
2. To include students in the execution of curricula
3. To implement new teaching pedagogical methods and to improve the grading system
4. To improve methodologies of distance learning
5. To expand the possibilities of experimental and practical learning
6. To improve lifelong education and development.

These strategic measures are implemented through 16 points which are clearly defined by a strategic action plan, aimed at a successful achievement of targets.

The execution of study programmes is justified by the [Graduate Students Employability Analysis](#). Employment data were collected on a sample of 365 students who completed their studies in academic years 2016/2017, 2017/2018, and 2018/2019. Only 7.09% analysed students were unemployed. Students prevalingly found jobs in the real sector (49.1%), followed by trade and profession-related services (18.41%), public sector (9.21%), universities and institutes in Croatia (8.18%), professional activities abroad (7.93%), and activities abroad not related to their profession (1.28%). The analysis shows that the Faculty is educating competitive experts for national and international labour markets.

The study programme in English, Chemical and Environmental Technology has been conducted since the academic year 2019/2020. Prior to its launch, the [Execution Justification Study](#) was drafted, and several economic operators sent their [Letters of Support](#).

[Recommendations for Education Enrolment Policy and Scholarship Policy](#) of the Croatian Employment Bureau indicate a deficiency of Chemical Engineers and Chemical

Technologists in two areas in vicinity of Zagreb, whereas in three areas near Split there is a surplus of such profiles. Such surplus can be related to the education of these profiles at the Faculty of Chemistry and Technology of the University of Split. For other regions in Croatia, the Bureau indicates neither deficiency nor surplus. Based on the above data, the execution of the subject study programme is justified.

The Faculty continuously analyses its capacity for the execution of its study programmes, through the [Annual Self-analysis](#). These analyses contain detailed indicators and multiannual trends in the areas of teaching, and scientific and professional activities of the Faculty, as well as the teaching, spatial, and other resources analysis. Multiannual data on enrolled students was elaborated, along with the interest for undergraduate, graduate, and postgraduate Ph.D. study programmes, passing quotas, and verification methods for learning outcomes. The analysis indicates that study programmes are executed with sufficient human (students : teachers ratio = 17.84; students: teachers and associates = 11.89) and spatial capacities, except for certain spatial capacity deficiencies indicated in the Section IV.4 of this Self-analysis.

Upon the completion of undergraduate and graduate study programmes, the corresponding [academic titles are assigned, as regulated and prescribed by the Republic of Croatia Rector's Council](#) and indicated in the below Table II.1. For all graduate and undergraduate study programmes, occupational standards were prepared and submitted for registration in the [Croatian Qualifications Framework Register](#).

Table II.1. Academic titles and abbreviations acquired at the study programme completion

Study programme	Academic titles and abbreviations	
	Undergraduate level	Graduate level
Chemical Engineering	University Bachelor (<i>baccalaureus/baccalaurea</i>) in Chemical Engineering (univ. bacc. ing. cheming.)	Master in Chemical Engineering (mag. ing. cheming.)
Material Science and Engineering	University Bachelor (<i>baccalaureus/baccalaurea</i>) in Material Science and Engineering (univ. bacc. ing. cheming.)	Master in Chemical Engineering (mag. ing. cheming.)
Environmental Engineering	University Bachelor (<i>baccalaureus/baccalaurea</i>) in Environmental Engineering (univ. bacc. ing. oecoing.)	Master in Environmental Engineering (mag. ing. oecoing.)
Applied Chemistry	University Bachelor (<i>baccalaureus/baccalaurea</i>) in Applied Chemistry (univ. bacc. appl. chem)	Master in Applied Chemistry (mag. appl. chem.)
Chemical and Environmental Technology		Master in Chemical Engineering (mag. ing. cheming.)

II.2 Expected learning outcomes of study programmes executed at the Higher Education Institution correspond to the level and profile of the acquired qualifications

The Higher Education Institution has defined clear study programme learning outcomes, compliant with the Higher Education Institution mission and objectives.

The Higher Education Institution verifies and ensures the compliance of learning outcomes at the level of study programme and a single course.

Learning outcomes achieved at the completion of a study programme correspond to the descriptions of the programme execution levels of Croatian Qualification Framework (HKO) and the European Qualification Framework (EQF).

When defining learning outcomes, the Higher Education Institution acts in accordance with the requirements of the profession and its internationally acknowledged standards and ensures the contemporary nature of the programme (profile).

Expected learning outcomes reflect competencies necessary for the inclusion in the labour market, continuous education, or other needs of the individual or the society.

Studying rules of the Faculty are regulated by the [University Undergraduate and Graduate Study Programmes Ordinance](#), [Joint Graduate Study Programme Chemical and Environmental Technology Ordinance](#), and the [University of Zagreb Ph.D. Studies Ordinance](#).

Learning outcomes of undergraduate and graduate study programmes are aligned with the Faculty's mission and vision defined by the [Faculty of Chemical Engineering and Technology Development Strategy \(2021 – 2031\)](#). The Faculty's vision points out the Faculty as a pivotal institution of the Republic of Croatia, dedicated to the creation, transfer, and application of new knowledge in the fields of Chemical Engineering, Applied Chemistry, Material Engineering, and Environmental Engineering. These frameworks contain all study programmes executed at the Faculty. The Faculty's mission emphasises continuous improvement of existing and new studies, internationalisation, increased mobility, and implementation of lifelong education as a guarantee of the Faculty's progress.

To students in the education process, learning outcomes ensure employability. They are acquiring competencies for future needs of labour markets, social and civil competencies (personal, interpersonal, and intercultural), and basic skills (literacy, including mathematical, digital, and technical literacy) which can be applied in a various and constantly changing environment.

The learning outcomes for individual courses of undergraduate and graduate study programmes, in accordance with Bloom's taxonomy, were first defined in the academic year 2010/2011. After a supplementary workshop on learning outcomes, organised by the University of Zagreb Centre for Improvement of Teaching Competencies in the academic year 2014/2015, all learning outcomes of a course were redefined, with a clear definition of learning outcomes of study programmes in Croatian and English. The learning outcomes of undergraduate and graduate study programmes are part of the [ECTS Information Package](#). The clarity of study programme learning outcomes is verified by recently graduated students through a Quality Assurance Survey conducted by the University of Zagreb. The latest available data on the results of the survey are from the [academic year 2019/2020](#). The survey question no. B32 ("Clear definition of the outcome of the course or knowledge and skills to be acquired by a student upon the completion of a course") was evaluated by 123 graduated students of four undergraduate study programmes with an average score of 3.90 (the lowest score is 1 and the highest one is 5). The same question [in the survey for graduate students, under the survey question](#) no. B16, was evaluated by 133 graduated students of four graduate

study programmes with an average score of 4.17. The results show that from the students' perspective, the learning outcomes are well formulated.

Learning outcomes of the study programme Chemical and Environmental Technology are defined in document [Detailed proposal of the study programme](#). The learning outcomes of all courses of postgraduate doctoral study programme Chemical Engineering and Applied Chemistry, public defence of the doctoral dissertation topic, and other compulsory and elective forms of work, are defined in the [University Doctoral Study Programme Chemical Engineering and Applied Chemistry Self-analysis](#).

The compliance of learning outcomes of study programmes and single courses is indicated in the Information Package and in the Table 2.1 of the Analytical Supplement. The results presented in this table show for each undergraduate and graduate study programme that a sufficient number of course learning outcomes contribute to the learning outcomes of a study programme. For undergraduate study programmes, the number of obligatory courses contributing to study programme learning outcomes varies from a minimum of 6 to a maximum of 24. Graduate study programmes, however, have fewer courses and more elective courses that are not included in the analysis, and therefore, the number of obligatory courses that contribute to each learning outcome varies from a minimum of 4 to a maximum of 17. Pursuant to the above, it can be concluded that the achievement of the course learning outcomes ensures the achievement of study programme learning outcomes and corresponding competencies.

Learning outcomes of all study programmes have been revised as part of the project [TARGET – the Establishment of Higher Education Standards of Qualifications and Occupations in Mining, Geology, and Chemical Technology](#), funded by the European Union, in which the Faculty participated from June 2015 until September 2016. Within the project TARGET a survey of employers was conducted regarding competencies deriving from learning outcomes, and which was used to review learning outcomes and align them to descriptions of the corresponding levels of the Croatian and European Qualifications Frameworks (HKO and EQF). Learning outcomes of study programmes executed at the Faculty correspond to descriptions of the level 6 of cognitive skills for undergraduate university study programmes, level 7.1 of cognitive skills for graduate study programmes and level 8.2 of cognitive skills for postgraduate doctoral study programmes, where the levels are defined by the [Croatian Qualifications Framework Act](#) and its amendments (official gazette "Narodne Novine" no. 41/2016, 64/2018, 47/2020, [20/2021](#)). Descriptions contained in this Act as a set of knowledge, cognitive, psychomotor, and social skills, autonomy, and responsibility were transformed into the learning outcomes of the Faculty study programmes, which derive from the learning outcomes of individual courses. Learning outcomes are consistent with the requirements of the profession and relevant internationally acknowledged standards. The expected learning outcomes reflect the competencies acquired through the completion of studies defined in the [Diploma Supplement](#), provided together with the diploma. All documents were adopted at the Faculty Council sessions.

The high quality of acquired competencies can also be found in the regular analysis of the employability of graduated Faculty students. [According to the analysis conducted in 2020](#), approximately 17% of graduated students immediately started working, 43% found employment after three months, 67% after six months, and 85% after 12 months, which is an increase from the previous three-year period. The trend was going towards better results, but because of the coronavirus pandemic, the employment was put on hold in the period from March to June 2020. Furthermore, the analysis reveals a trend of increasing mobility of undergraduate students to graduate study programmes abroad and in a number of graduate

students to doctoral studies abroad. One part of graduated students (approximately 8%) has been employed in their profession abroad. The analysis shows that the Faculty has established experts of profiled competencies, competitive in the national and international labour markets. Aside from that, the unemployment rate is being assessed in the Faculty [Annual Self-analysis](#) (table 3.3, p. 33) based on the data from the Croatian Employment Bureau. The analysis indicates that only 25 Faculty students who completed their graduate study programmes on 30 June 2021 were without working experience, showing that the admission quotas for undergraduate and graduate study programmes are harmonised with the needs of the labour market. The admission quotas for study programmes of both levels are determined each year. The decision is issued by the Faculty Council and approved by the University of Zagreb.

Undergraduate and graduate study programmes Chemical Engineering, Material Science and Engineering, and Environmental Engineering, executed at the Faculty in the field of technical science, are aligned with [Recommendations of the European Federation of Chemical Engineers \(EFCE\)](#), which further ensures international recognition of graduated students.

Information on the study programmes is collected also through surveys of employers. The project TARGET analysed approximately 130 employers' surveys on general competencies, and specific competencies of the Faculty graduated students. In addition, the Faculty has surveyed employers as part of the project [CeSaR – Advisory and Students' Career Development Centre](#). Employers have repeatedly emphasised graduated students' lack of competencies for the work in the industrial sector. The Faculty has, therefore, introduced internships at graduate study programmes level, compulsory for Chemical Engineering and elective in other study programmes. The change was recorded as a minor change and addition to study programmes (up to 20%) and approved by the Quality Board of the University of Zagreb. Other justified comments will be thoroughly considered during the planned wider review of undergraduate and graduate programmes.

As a result of the project TARGET, occupational and [qualification standards](#) were developed for all undergraduate and graduate study programmes (Chemical Engineering, Material Science and Engineering, Environmental Engineering, and Applied Chemistry). Occupational standards were submitted to the Sector Council for evaluation and registration in the Occupational Standards Register, as the basis for the subsequent registration of qualification standards pursuant to the procedure prescribed by the [Croatian Qualifications Framework](#).

II.3 The Higher Education Institution demonstrates the achievement of expected learning outcomes of executed study programmes

The Higher Education Institution ensures the achievement of expected learning outcomes at the executed study programmes.

The Higher Education Institution, based on evidence of the achievement of expected learning outcomes (e.g., student tests, seminars, presentations, and similar), continuously reviews and improves the teaching process.

The Faculty continuously verifies the achievement of study programmes learning outcomes, as indicated in the [Annual Self-analysis](#) [Table 2.3 a) and b)]. Teachers evaluate the achievement of the course learning outcomes and consequently the outcomes of study programmes to which courses contribute, through [laboratory reports](#), [homework problems](#), individual or [group seminar papers](#), [project-related presentations](#), [partial examination tests](#), and [written](#) and oral exams. The achievement of learning outcomes is further analysed

during the preparation and defence of the [undergraduate](#) or [graduate](#) thesis. The number of ECTS credits obtained during a study programme is verified prior to the thesis defence. Undergraduate and graduate theses are prepared in line with the rules contained in the [Ordinance on the preparation of undergraduate or graduate thesis and on undertaking the final or graduate exam at the university undergraduate and graduate study programmes of the Faculty of Chemical Engineering and Technology of the University of Zagreb](#). [Defence dates](#) as well as [undergraduate](#) or [graduate theses topics](#) are approved by the Faculty Council. During the presentation and defence of the undergraduate or graduate thesis, three teachers, members of the Defence Commission, verify whether the learning outcomes were achieved at the level of the study programme. The undergraduate and graduate theses are archived in paper format in the Library and Information Centre of the Faculty, whereas the electronic format is archived in the database [Dabar](#).

The University of Zagreb conducts surveys of graduated students. The survey question no. 32 (“To what extent has the study programme prepared you to work in your profession?”), has been evaluated by graduate students in the [academic year 2019/2020](#). The average score was 3.38 (the lowest score is 1 and the highest one is 5), indicating that graduated students averagely feel well-prepared for the work in their profession.

The achievement of the learning outcomes and quality of the Faculty graduate students was evaluated by questions in the [project CeSaR survey](#). One of the questions evaluated the performance of new employees, who had recently graduated from the university (page 8). Surveyed employers (31) assessed the performance as follows: 48.3% as high, 31.0% as satisfactory, 3.7% less than expected, whereas 17% withdrew from the evaluation because they did not have any new hires. The analysis emphasised that only a small part of employers (less than 4%) were not satisfied with the performance of Faculty graduated students. Employers evaluated the achievement of learning outcomes also in the survey conducted under the project TARGET. The questions were about competencies they consider as important in their companies and to what extent students with the Faculty bachelor or master degree, employed by their companies, are lacking such competencies. Surveys have been conducted and analysed separately for each study programme ([KI](#), [KIM](#), [EI](#), [PK](#)) and have therefore offered a set of specific indicators on possible improvements for the upcoming study programmes revision.

Teachers, especially assistant professors, attend [seminars and workshops](#) such as Modern teaching methods – a psychological basis; Modern teaching methods – learning, memory, and development of knowledge; How to define objectives and learning outcomes – case study; Communication skills; and Student motivation techniques, and continuously develop their teaching competencies to further improve learning outcomes. [Some teachers attended](#) the workshops entitled: [How to write learning outcomes and revise them in accordance with the Croatian Qualifications Framework?](#), and Active learning and critical thinking workshops in higher education, organised by the Institute for Development of Education. Considering that in the past two academic years, the coronavirus pandemic has shifted focus from classic to hybrid methods of teaching which includes online classes, many teachers attended workshops of the E-learning Centre of the University Computing Centre, such as Learning outcomes in the system “Moodle” (A150); Learning outcomes and validation methods in e-courses, and of the [European Distance Learning Network \(EDEN\)](#). A part of these workshops was aimed at the verification of learning outcomes during distance teaching. Before the beginning of the academic year 2020/2021, the Faculty organised a [workshop for teachers regarding the use of online tools](#) (Zoom, Teams, WebEx), and the e-learning system Merlin.

In accordance with the Quality Assurance good practices at the University of Zagreb, changes in study programmes are carefully planned and integrated into the annual [Quality Assurance Action Plan of the Constituent](#) (Chapter 2: Study programme approval, continuous monitoring, periodic evaluation, and review). Upon the completion of the academic year, these changes are summed up in the [Annual Report on the Constituent Quality Assurance](#). Pursuant to the above-mentioned documents, major changes in the academic year 2020/2021 were the introduction of several new elective courses and the following compulsory courses: Innovation-based Entrepreneurship; Innovation Management; and Internship in graduate study programmes.

Study programme changes must follow a clearly defined protocol. When applying for the approval of a new elective course or changes to the existing course, the [Faculty Education Commission](#) analyses the impact on learning outcomes of the subject study programme. Changes must be confirmed by the Faculty Council, and [prescribed forms](#) must be submitted to the Quality Board of the University of Zagreb for [the final decision on the proposed changes](#). Changes are implemented in the Teaching Execution Plan for the following academic year and the [ECTS Information Package](#) is issued. The Quality Board has thus far recorded all changes to study programmes as minor and as additions to the study programme below 20%. These changes are related to the introduction of new compulsory and elective courses, redistribution of teaching hours, and partial change of ECTS credits. Furthermore, the Faculty Council confirms minor changes in the course content, student obligations, conditions for course enrolment, methods of evaluation of the course learning outcomes, and changes of course owners, as part of the Teaching Execution Plan, which is subsequently referred to the University of Zagreb as minor changes and additions to study programme below 20%.

II.4 Using the feedback from students, employers, professional associations, and alumni for purposes of planning, proposing, and adopting new programmes and reviewing or cancelling the existing ones

Development activities related to study programmes are systematic and regular and include different stakeholders.

Planning and proposal of a new study programme include an analysis of the justifiability, capacity, and compliance with strategic objectives at the local and national level, as well as with other social needs.

The Higher Education Institution demonstrates the justification for the execution of identical or similar study programmes within the same university.

The Higher Education Institution publishes updated versions of its study programmes.

The Higher Education Institution records changes to study programmes and analyses their purpose.

A thorough revision of undergraduate and graduate study programmes was initiated in the academic year 2019/2020. By virtue of the [Dean's Decision](#), Working groups were established and the Education Commission co-ordinated their activities. A framework plan of changes and amendments was proposed under the revision, and the analysis of courses content was conducted to identify potential overlapping. Operative meetings were organised with the course owners and student representatives to discuss specific topics, especially those related to the workload of students and its compliance with ECTS credits. The revision, furthermore, analysed the results of the employers' surveys regarding graduated students' competencies. In March 2020, the revision was suspended because of the coronavirus pandemic, but endeavours to continue as soon as the epidemiological situation improves.

Study programmes improvements were initiated by teachers, the Reaccreditation Commission, the Education Commission, and by economic operators.

- Teachers are modifying existing courses, or proposing new ones, according to trends in scientific areas related to the study programme. For example, new elective courses were introduced, such as: Additive Manufacturing in Chemical Engineering; Artificial Intelligence in Chemical Engineering; and Internship, whereas some of the existing courses were amended: Chemical Reactors; Ecotoxicology; and Ecology. Some courses have been replaced by new ones, where both the content and the learning outcomes were changed: a new compulsory course Innovation-based Entrepreneurship replaced the course Management; a new compulsory course Innovation Management replaced the course Introduction to Management; a new compulsory course Nanomaterials and Nanotechnology replaced the course Chemical and Physical Properties of Surfaces and Nanostructures.
- The [2015 recommendations of the Reaccreditation Commission](#) for the improvement of undergraduate and graduate study programmes encourage public and private sector stakeholders to monitor study programmes. They also advise better defining of students' competencies, using well-formulated learning outcomes. This section presents elements of the inclusion of economic operators, whereas the competencies for all study programmes are defined in the occupational standards ([KI](#), [KIM](#), [EI](#), [PK](#)), implemented in project TARGET. In 2018, the Accreditation Commission evaluated scientific doctoral study programme Chemical Engineering and Applied Chemistry and awarded it a "[high quality label](#)" (page 6). However, the study was launched in the year 2014/2015, and only one Ph.D. thesis was defended at the moment of the reaccreditation process, so the Agency for Science and Higher Education requested, in its [Accreditation Recommendation](#), the adoption of an [action plan](#) aimed at the quality improvement and regular reporting on the improvement progress. For these activities the Council of the Doctoral Study Programme, appointed by the Faculty Council is responsible and the activities are conducted regularly ([2020 pages 73-84](#), [2021 pages 17-28](#)).
- Students' opinions and views of the Faculty study programmes are monitored by student representatives who actively participate in the work of the Faculty Council and the Education Commission, and through surveys conducted by the University of Zagreb.
- Certain changes aimed at the improvement of study programmes were initiated also by economic operators. Economic operators gathered in 2017 at the Croatian Academy of Sciences and Arts to discuss the topic "What knowledge the industry expects from students graduated in chemistry, applied chemistry or chemical technology?" and identified the lack of practical skills of graduated chemical engineers. As a result of this initiative, the Faculty has submitted the project [Advisory and Students' Career Development Centre](#) (CeSaR), aimed at developing, improving, and implementing internships at the Faculty of Chemical Engineering and Technology. The project financing was approved (UP.03.1.1.04.0026) and the project is being conducted at the Faculty (2020 – 2023), with internships implemented at all four Faculty graduate study programmes.

The process of proposing and adopting a new study programme is meticulous. The Faculty applied for the project entitled Chemical and Environmental Technology, graduate study programme in English (UP.03.1.1.02.0001), within the framework of ESF Operational Programme Efficient Human Resources 2014-2020 and the call for tender UP.03.1.1.02. The internationalisation of higher education. The Ministry of Science and Education has decided

in 2018, to fund the project in the amount of 1,799,767.97 kuna. Therefore, a new graduate study programme in English was launched, entitled [Chemical and Environmental Technology](#) and executed in partnership with the Faculty of Chemistry and Technology of the University of Split. [The evaluation of the study programme in English was conducted at the University of Zagreb](#) in accordance with the [Ordinance on the Evaluation Procedure for Undergraduate and Graduate University Study Programmes and Integrated Undergraduate and Graduate Study programmes of the University of Zagreb](#), Act on Science and Higher Education Quality Assurance, and the Ordinance on the authorisation content and requirements for the issuance of authorisation for the execution of higher education activities, study programmes and the higher education institutions' reaccreditation. All prescribed documentation has been prepared, including the Study on the proposed study programme execution justification, Detailed Overview of the Study Programme, Description of personnel and facilities conditions, Curricula Vitae of the programme owners, Financial Analysis of the Study Programme Applicant, Study Programme Quality Assurance Plan, and others. Furthermore, the Agreement on the execution of the joint study programme has been concluded, between the programme owner and partners, letters of support were collected from the economic sector, a list of student forms was drafted and similar. Upon the completion of the documentation, councils of both faculties adopted the Study Programme Detailed Overview and in 2019 the process of study programme evaluation started at the University of Zagreb. Upon the completion of the evaluation, the study programme was adopted on the Technical Area Council and the University of Zagreb Senate, followed by the University of Split Senate, satisfying thus the condition for the registration into the Register of Study Programmes. The Ministry of Science and Education, pursuant to the Decision on the organisation and performance of the study programme of the University of Zagreb, submitted to the Faculty the Certificate of registration of this study in the [Register of Study Programmes](#).

During the application for the approval of the study programme Chemical and Environmental Technology, conducted in English since the academic year 2019/2020, similar [study programmes in English were analysed in the Republic of Croatia and in Europe](#) (pages 3-4).

During the proposal of undergraduate and graduate study programmes conducted at the Faculty since the academic year 2005/2006 (Chemical Engineering, Material Science and Engineering, Environmental Engineering, and Applied Chemistry), similar study programmes conducted at the University of Zagreb and other universities in Croatia were analysed. There was overlapping between the Faculty undergraduate study programme **Applied Chemistry** and the undergraduate study programme **Chemistry** executed at the Faculty of Science and Mathematics at the University of Zagreb (PMF), where basic courses were common to all regulated chemistry studies: general, inorganic, organic, analytical, and physical chemistry, along with mathematics and physics. However, whereas the PMF's programme **Chemistry** is extended by the basics of other natural sciences (biochemistry and mineralogy) with further deepening of the chemical courses, the Faculty study programme **Applied Chemistry** offers basic technical knowledge (engineering, electrical engineering, chemical engineering, and material science), and provides students with broader knowledge and a starting point for a wider range of graduate study programmes. This difference is shown also in graduate study programmes. Undergraduate and graduate study programmes **Material Science and Engineering** overlaps insignificantly with the curriculum of Materials Engineering at the undergraduate and graduate study programme **Engineering** conducted at the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb ("FSB"), prevailingly regarding polymer and composite materials. The FSB study programme focuses on mechanical and application material properties and

processing, whereas the Faculty programme is directed towards the methods of synthesis and enrichment of materials, connecting material properties to their chemical composition and structure. When the Faculty proposed the undergraduate and graduate study programme **Environmental Engineering**, there was no similar study at the University. The undergraduate study programme **Environmental Engineering** and Environmental Engineering as a course of graduate study programme **Geoengineering** conducted at the Faculty of Geotechnical Engineering in Varaždin of the University of Zagreb have slight similarities with the Faculty study programmes, but with significant difference regarding courses and approach. The undergraduate Faculty study programmes share certain parts of its courses with other related technical and biotechnical faculties of the University of Zagreb (Faculty of Metallurgy, Faculty of Food Technology and Biotechnology, Faculty of Textile Technology); however, this is found only in basic courses, with very different expert advancement.

All changes made to the study programme are updated in the system ISVU (the Information System of Higher Education Institutions), at the Faculty website, and in the Information Package prior to the beginning of the academic year.

The improvement of undergraduate and graduate study programmes is driven by applicants for proposed changes, the Education Commission, and the Faculty Council. The applications are submitted in the prescribed form and in line with the procedure to the Quality Board of the University of Zagreb, in charge of change approval and assessment of the scope of implemented changes (see chapter II.3).

II.5 Higher Education Institution ensures the compliance of ECTS credits with the actual workload of students

The Higher Education Institution adjusts ECTS points to the actual student workload, based on stakeholders' feedback in teaching or other processes.

The feedback on the collected data analysis and implemented changes is available to students.

ECTS credits for undergraduate and graduate courses executed at the Faculty are determined by the [ECTS Information Package](#) and the [Student Guide](#). The [ECTS Co-ordinator](#) and Vice Dean for Education are responsible for the assignment and acknowledgement of ECTS credits acquired outside the Faculty. The compliance of ECTS credits with the actual workload of students is verified through the University of Zagreb survey, taken by students who graduated in a given academic year. The survey is conducted every year and the results are processed by the University of Zagreb. In the last survey analysis of [undergraduate](#) and [graduate](#) study programmes in the academic year 2019/2020, survey question no. 65 ("To what extent the ECTS credits are aligned with the actual teaching workload in courses?") was evaluated with an average score of 3.26 for all undergraduate study programmes at the Faculty. The same question (no. 36) in the graduate study survey was evaluated with an average score of 3.04, on a scale of 1 (lowest) to 5 (highest). The survey results indicate the need for further improvement in the compliance of ECTS credits with the actual workload of students. Therefore, at end of the academic year 2020/2021, a detailed survey was conducted for all students in the final stage of their undergraduate and graduate study programmes. The question "Does the actual student workload correspond to the assigned ECTS credits?" was asked for each course and students could choose between the following answers:

- -1: The number of credits should be reduced because the workload is too light compared to allocated ECTS credits – describing the reason is MANDATORY

- 0: The number of credits is well or sufficiently balanced to allocated ECTS credits
- +1: The number of credits should be increased because the workload is too heavy compared to allocated ECTS credits – describing the reason is MANDATORY

The survey results for [undergraduate](#) and [graduate](#) studies were analysed by the Quality Commission and submitted to the Education Commission. The summary is presented in below Table 2.2.

Table 2.2 Results of the survey on the ECTS credits compliance with students' workload

Study programme	Total number of courses	Number of students	¹ Courses with a score -1			¹ Courses with a score +1			
			10-30%	31-50%	51-70%	10-30%	31-50%	51-70%	
Undergraduate programmes									
Chemical Engineering	39	59	1	-	-	3	1	1	
Material Science and Engineering	38	40	2	-	-	2	-	-	
Environmental Engineering	45	25	1	-	-	6	-	2	
Applied Chemistry	47	35	-	-	-	1	3	1	
Graduate programmes									
	Environmental Chemical Engineering	32	12	1	-	-	2	4	-
Chemical Engineering	Chemical Process Engineering	32	13	2	-	-	2	-	-
	Chemical Technologies and Products	32	13	2	-	-	3	-	-
	Material Science and Engineering	35	24	2	1	-	1	-	-
	Environmental Engineering	29	16	-	-	-	1	-	-
	Applied Chemistry	54	27	3	-	-	4	-	-

¹ Answers are grouped by the percentage of students who selected the relevant answer

The analysis of non-compliance of ECTS credits to the actual workload in individual courses will be conducted during the overall review of undergraduate and graduate study programmes, already underway and with the involvement of the relevant teachers. Students can access the feedback on the results of the university survey and the Faculty survey through the Faculty website.

II.6 Internship represents an integral part of study programmes

The Higher Education Institution facilitates learning and the acquisition of skills through internship, where applicable.

Internship is part of study programmes, organised outside the Higher Education Institution, in co-operation with the labour market, where applicable.

Internship is conducted systematically and responsibly and aims at the achievement of the related expected learning outcomes.

Internship is an integral part of all Faculty undergraduate study programmes curriculum. Its execution is regulated by the [Ordinance on compulsory internship for undergraduate students](#) and the [Internship Procedure Document](#), with the supervision of the [Faculty co-ordinator](#). The Faculty has concluded contracts with companies that expressed interest in this programme. Internship in undergraduate study programmes encompasses twenty days (160 hours), and it is usually organised after the second year of study when lectures are not held (mostly during summer holidays). The students have the obligation to maintain a [work logbook](#), which must be verified by the person who supervised the student, at the end of the internship. The student submits the verified logbook and the [certificate of completed internship](#) to the Faculty co-ordinator, who evaluates the learning outcomes. For the internship of undergraduate study programmes ECTS credits are not assigned. Such deficiency shall be adjusted during the review of study programmes. Undergraduate students can also benefit from additional internship opportunities at the training facilities established under the project CeSaR, which is certified and registered in the diploma supplement.

The internship was integrated into all graduate study programmes in the academic year 2020/2021, as compulsory for Chemical Engineering and elective in other study programmes (Material Science and Engineering, Environmental Engineering, and Applied Chemistry). The University of Zagreb Quality Board has recorded this change as minor and as an addition to the study programme below 20%. The concept of internship was developed under the project CeSaR. The internship course is executed through guided practical training exercises where students acquire practical skills (40 hours) and knowledge about the relevant economic areas (80 hours). Students are organised in smaller groups and the learning outcomes are assessed by the internship managers, based on the activities conducted during internship and papers drafted by the student.

At the end of the internship, students acquire competencies necessary for the labour market, aimed at the increase of their employability. The activities were structured based on EU good practices and employers' opinions and suggestions. The survey included representatives of 31 companies and institutions and it contained 27 questions, divided into two parts:

- Multiple response questions related to student evaluation during internship and evaluation of employees graduated from the Faculty;
- Suggestions on student knowledge and skills improvement during the studies at the Faculty.

As part of the project CeSaR, the development of the [application Internship](#) is in its final stage, which shall offer numerous possibilities. Students will log to the application using their AAI@EduHr ID and access a database of potential employers. They will also have the possibility to register new employers, with an automatic request to the employer to confirm its acceptance. Upon a positive response, the employer shall receive login details to access the application. The application allows for peer evaluation of students and employers. Such evaluations shall be systematically collected and analysed to improve the internship quality. The application will also allow for digital signing of contracts between the Faculty and the employers.

Aside from the undergraduate and graduate study programmes internship, students can choose other forms of internship, such as the [German economy program for Western Balkan countries](#) or [Erasmus+ programmes](#). These opportunities are regularly advertised to students on the Faculty website.

III Teaching Process and Support to Students

III.1 Admission or continuation of studies requirements are clear, published, consistently applied, and compliant to the requirements of study programmes

The criteria for admission or continuation of studies are published.

The criteria for admission or continuation of studies are consistently applied.

The criteria for admission or continuation of studies ensure the selection of candidates with appropriate knowledge, relevant to the requirements of the study programme.

The Higher Education Institution has an effective mechanism for acknowledgment of previous learning.

All relevant information to future students regarding the undergraduate programmes – application, quotas, plans and study programmes, rules of study, and similar – are available on the [Faculty website](#). The admission requirements and quotas for the first year of undergraduate study programmes are available to future students through the [application “Postani student”](#) (Become a Student) of the National Information System for Higher Education (NISpVU). The information is also available in the [general](#) and [special](#) part of the Call for admission to the first year of undergraduate and integrated undergraduate and graduate study programmes of the University of Zagreb, issued for each academic year and published on the websites of the [University of Zagreb](#) and [the Faculty](#). Other information related to the rules of study, students’ rights and obligations, student standards, and similar are contained in the [Student Guide](#), also available on the Faculty website. The Faculty holds presentations to future students every year through the [Brochure for first-year students](#), published on the Faculty website, through the Faculty Exhibition, intended for high school students in their final year of studies, through workshops conducted by students at high schools, through the Faculty Open-door Day, and through the [promotional video](#), published on the Faculty website.

The admission criteria for undergraduate and graduate study programmes are defined upon the [University's call](#) for the submission of proposed admission quotas and criteria, which are presented and adopted at the Faculty Council session. When Faculty requesting an [increase in quotas](#), the Education Commission analyses the labour market needs (employability) and the Faculty capacity and the ability, considering the occupancy of previous years’ quota, as indicated in detail Section II.2. Admission quotas and criteria for undergraduate study programmes are subject to analysis. After accepting the enrolment quotas and criteria, the University announces a Call for enrolment in undergraduate and integrated undergraduate and graduate study programmes, which is published on the [University's website](#) and the [Faculty's website](#).

The [admission criteria for undergraduate study programmes](#) clearly define the classification process, validation of high school grades, level of high school state graduation exam, and the score of additional achievements. The application process is conducted through the [system NISpVU](#). The Faculty Council issues the [Transfer Requirements Decision](#) for students transferring from a Faculty undergraduate study programme to another and the acknowledgment of completed exams. The application procedure is conducted through the Admissions Office, in accordance with the instructions published on the [Faculty website](#). It also contains the [conditions and procedures](#) for transfer from other university study programmes to the Faculty undergraduate study programmes.

The Faculty endeavours to increase the quality of candidates admitted to its undergraduate study programmes. A detailed analysis of passing rate in the previous period showed that students who did not take the final high school exam in Chemistry or who

passed it with a poor grade, failed to pass key courses General and Inorganic Chemistry and General Chemistry even after eight (8) attempts. These courses are a prerequisite for admission to the second year, and therefore, the students were forced to change the study programme. Thus, starting from the academic year 2019/2020, the Faculty adjusted the criteria for admission to the first year of undergraduate study programmes ([page 8 of the Minutes of the 219th session of the Faculty Council](#)) and introduced Chemistry as a compulsory high school graduation exam. Before that, candidates who took Chemistry as an elective course were awarded 100 points. The introduction of a compulsory high school graduation exam in Chemistry reduced the interest in all Faculty study programmes, as shown in the Table 3.2 of the Analytical Supplement, but the admission quotas were nevertheless fulfilled. [The analysis of the passing score of General Chemistry and General and Inorganic Chemistry](#) showed its increase compared to previous years, even during the pandemic academic year 2020/2021. Furthermore, students who enrolled in the undergraduate study programme Environmental Engineering were prevailingly those with lower overall scores compared to other study programmes, where the pandemic most probably showed its negative effect. In the upcoming period, the Faculty will undertake measures aimed to increase the quality of candidates admitted to this study programme. The analysis of admission and passing scores is presented each year to the Faculty Council by Dean's Report and the Report of Vice Dean for Education. The Education Commission discusses admission and transfer criteria in order to prepare a proposal discussed and adopted at the Faculty Council session. An example is the [Report of Vice Dean for Education from 26 October 2020](#). (239th session of the Faculty Council, page 6).

The admission procedure for graduate study programmes is published on the Faculty website. A filled [application form](#) and other prescribed documentation must be submitted to the Admissions Office, in accordance with the [Faculty Council Decision](#). The [call](#) defines admission requirements and quotas, and [the classification procedure](#). Upon the completion of the classification process, the Faculty publishes on its website the admission [ranking](#) for the first year of graduate study programmes. Candidates transferring from a university study programme from other higher education institutions to a Faculty study programme, must complete a supplementary course(s) or year(s), which is prepared by the Head of the Study programme based on the comparison of study programmes, acknowledgment of identical or similar courses with the consent of the course teacher and with the signature of the Vice Dean for Education, in accordance with article 9 of [Studying Ordinance](#).

To graduate programmes are admitted prevailingly students who have completed a Faculty undergraduate study programme and, therefore, possess adequate knowledge for the education continuation. Students from other higher education institutions are also admitted to these programmes but to a lesser extent, as shown in the Table 3.3 of the Analytical Supplement). The percentage of the Faculty students who completed their undergraduate study programmes and continued with their studies in graduate programmes is high. In the last five academic years completed, 650 bachelor students out of 682 (95%) continued with their studies in graduate programmes, which demonstrates their general satisfaction with the Faculty study programmes. In recent years, a smaller portion of students (22) who completed undergraduate study programmes at the Faculty, decided to continue their education abroad. Admission quotas and criteria for the study programme in English language, Chemical and Environmental Technology, are subject to the same procedure as for the programmes in Croatian and are published on the following [Faculty web page](#). The application procedure for foreign students and the relevant documentation are also published on the [Faculty website](#).

Information concerning the courses of undergraduate and graduate study programmes Environmental Engineering, Chemical Engineering, Material Science and Engineering, and Applied Chemistry is available at the [Faculty website](#) and in the [ECTS Information Package](#). The information regarding the programme in English, Chemical and Environmental Technology, can be found on the following [Faculty web page](#), whereas those regarding the postgraduate Ph.D. programme Chemical Engineering and Applied Chemistry on the following [Faculty web page](#). Students can acquire all details about teaching process, exams, learning outcomes, necessary literature, and similar.

Within horizontal mobility, the Faculty students may enrol courses and take exams at another higher education institution. In order to do so, students must [apply](#) for an elective course at another higher education institution and deliver a [signed certificate](#) from such higher education institution containing the information on the course title, owner, content, schedule, and ECTS credits. The application is approved by Vice Dean for Education, upon the proposal of the ECTS Co-ordinator. Upon the completion of the exam, students deliver to the Admissions Office the [evidence of the completion](#). The election course grade is registered in the ISVU system.

Achievements of students participating in one of the international exchange programmes are acknowledged in accordance with the [University of Zagreb Mobility Ordinance](#). Upon the request of the student and with valid proof of conducted activities, the achievements realised outside regular educational activities in Croatia or abroad may be [acknowledged](#), either as a substitution for a regular course or by registering in diploma supplement. The acknowledgement is subject to the approval of the ECTS credits, conducted by the University of Zagreb Working Group, in accordance with the [Extracurricular ECTS Credits Ordinance](#). Upon the approval of the ECTS Co-ordinator and the Vice Dean for Education, this information is entered in the ISVU system and the diploma supplement.

Students' achievements acquired at the institutions abroad as part of international exchange programme, are acknowledged in accordance with the learning contract signed with [partner institutions](#). Upon the approval of the ECTS Co-ordinator and the Vice Dean for Education, this information is entered into the ISVU system.

III.2 The Higher Education Institution collects and analyses data on students' progress and ensures students' continuation and completion of study

Student progress procedures are clear and accessible.

The collection and analysis of data concerning students' progress are regularly conducted.

The Higher Education Institution ensures effective mechanisms for the analysis of students' success and passing rate and uses such data to take appropriate actions.

Based on the analysis of data available in the ISVU system, the Faculty monitors student progress, success, and passing rate. Table 3.4 of the Analytical Supplement and [amended table 3.4](#), concerning the passing rate from first to second year of study in the last five academic years, it is evident that the passing rate of students who achieved 30-60 ECTS credits varies from 54 to 84%, and in academic year of evaluation 61-79%. Pursuant to conducted analyses it was determined that a small percentage of students earn more than 50 ECTS credits with the failure to pass the courses General Chemistry and General and Inorganic Chemistry, which is a prerequisite for enrolling in some courses from the second year. Therefore, a compulsory high school graduation exam in Chemistry has been introduced as a [mandatory admission requirement](#) (p. 8 of the Minutes of the 219th session of the Faculty Council). Its effect will be measurable in the upcoming period. Table 3.5 of the

Analytical Supplement concerning the completion of undergraduate and graduate study programmes indicates a reduction in the average duration of study over the years, which now amounts to 3.37 years for undergraduate study programmes and 1.97 years for graduate study programmes. The number of students for each academic year of undergraduate and graduate study programmes is submitted to the Faculty Council, at the beginning of the academic year, by the [Vice Dean for Education Report](#) (p. 5) and the [Annual Self-analysis](#) (Table 2.1).

Organisation of lectures affects the passing rate. During the preparation of the course schedule, the Faculty considers potential overlapping for students who are repeating certain courses. The Scheduling Commission successfully co-ordinates the teaching schedule and availability of teachers and facilities (classrooms, laboratories). [The teaching schedule](#) is structured prior to the beginning of each semester and published on the relevant web pages. The Scheduling Commission has drafted two teaching schedules in the academic year 2020/2021. One was intended for lectures organised in full contact and the other for lectures organised in partial contact, with the recommendations from the competent authorities and the University of Zagreb. Lectures with partial contact included distance learning, using the platforms Teams, Zoom, and WebEx, whereas laboratory exercises were conducted in full contact in small groups. Larger groups were divided into smaller ones which then attended classes in the classrooms, whereas the rest of the students followed online lectures through one of the above-mentioned platforms. For this purpose, the Faculty acquired new conference systems enabling a two-way teacher-student interaction, with easier participation and achievement of learning outcomes. Teachers are anyway encouraged to conduct their lectures in smaller groups, especially when conducting laboratory exercises, seminars, and project activities, as permitted by human and facility resources. In courses with laboratory exercises, students participate as assistants, helping other students in the execution of their exercises and testing of knowledge, and are awarded for such work.

Passing and completion rates of study programmes are presented to the Faculty Council each year, through the [Annual Self-analysis](#) (Table 2.2) and the [Vice Dean for Education Report](#).

A mentor is appointed to every first-year student, for purposes of communication and assistance at the beginning of studies. In the academic year 2018/2019, the project *Buddy* was implemented where senior students and the [Student Council](#) assist first-year students. The Faculty students active in the student section of the Croatian Society of Chemical Engineers (HDKI) prepared [video material](#) on Chemistry and Stoichiometry, helping the first-year students in better understanding of General Chemistry.

III.3 The Higher Education Institution ensures student-oriented teaching

The Higher Education Institution encourages different methods of teaching, in accordance with expected learning outcomes.

Various teaching methods are used to encourage interactive and research-oriented learning, problem solving, and creative and critical thinking (e.g., individual and group projects, collaborative learning, problem-based learning, field work, and other interactive methods).

Teaching methods are continuously evaluated and adjusted.

Teaching methods are adjusted to a diverse student population (non-traditional student population, part-time students, students of older age, under-represented* and vulnerable groups*, and similar).

The Higher Education Institution ensures the use of advanced technology to help modernise teaching.

Students are motivated and engaged through the availability and dedication of teachers.

The Higher Education Institution encourages students' independence and responsibility.

*Under-representation in higher education is defined as a lower share of a particular group of students in the total population in Croatia and in other European countries. The following under-represented groups were identified: students with less-educated parents; female students in the technical and male students in humanistic fields, older students, students with disabilities, students with children, Romani students.

**Vulnerability is understood as difficulty with students' academic or social integration, associated with certain personal characteristics of students.

The teaching process at the Faculty is executed in accordance with the [University of Zagreb Studying Strategy \(2014 - 2025\)](#) and [Studying Ordinance](#). Students gain their competence through different forms of teaching, which can be traditional (lectures, laboratory exercises, and seminars), project-based (individual or smaller group exercises in courses: Chemical Engineering Laboratory, Material Engineering Laboratory, Chemical Technology Laboratory, Environmental Engineering Laboratory), e-learning, learning on the field, or internship. Students are encouraged to use modern technologies, teamwork, and to develop their presentation skills. However, traditional teaching (classroom, face-to-face, ICT-supported lectures) and combined or hybrid teaching (combination of traditional and ICT-supported lectures) prevail. In the academic years 2019/2020 and 2020/2021, due to coronavirus pandemic, lectures and seminars were held at distance via platforms Teams, Zoom, and WebEx, in scheduled time, whereas the exercises were held in laboratories. Teachers are continuously trained on modern and active teaching methods and critical opinions, learning outcomes, and learning outcomes evaluation. They improved their competencies in workshops organised within projects TARGET (Active learning and critical thinking in higher education), CET (improving English language), and CeSaR (Modern teaching methods and similar).

Aside from traditional teaching methods (lectures, exercises, and seminars), other methods are also executed at the Faculty.

All teaching methods at the Faculty support and actively encourage **e-learning**, which is the objective of the University of Zagreb e-learning Strategy, by using the ICT in e-learning and at all levels of university education. The [E-learning Centre](#) of the University Computing Centre provides support to students in virtual environment and to teachers with the implementation of e-learning technologies in teaching process, preparation and [execution of e-courses](#), and training on e-learning technologies. Course owners apply the e-learning method, which is most appropriate for the course and its learning outcomes.

The Faculty conducts activities indicated in the [University of Zagreb Studying Strategy \(2014 - 2025\)](#), prevailing the inclusion of [all courses in e-learning](#) virtual space. Teachers are encouraged to adjust their teaching methods by introducing e-learning in

education, to raise the quality of education, achieve learning outcomes and the motivation of students. Each e-course at the Faculty has its version at the 2nd level of e-learning technology application, the teaching material in the e-learning system is organised according to teaching units, students and teachers communicate through forums, students can self-evaluate their knowledge, submit their homework through the e-learning system and receive its evaluation. Aside from the e-learning, the Faculty organises videoconferences, webinars, e-portfolio system, and similar, increasing thus the competitiveness of its study programmes, and training students to use modern lifelong learning technologies. Interactive and research-based learning is encouraged through various teaching methods, allowing students to address problems through creative and critical opinions.

Teachers are encouraged to develop 3rd level e-courses, in accordance with the criteria adopted by the Faculty Council and in accordance with the [University of Zagreb Decision](#) concerning university teaching methods in line with the level of e-learning technology application. The Faculty E-learning Commission is highly active and encourages teachers to attend [seminars, courses](#), and workshops organised by the E-learning Centre. Starting from the academic year 2018/2019 the [Best e-course Competition](#) is organised, in accordance with the [Best e-course Award Ordinance](#). The award consists of a certificate accompanied by a cash reward.

Teachers have been improving their knowledge and competencies since the first introduction of e-learning by attending [workshops and courses](#) (e.g., Basic operations in the system Merlin, Advanced operations in the system Merlin: learning outcomes, questions and tasks, user administration, and Preparation of virtual lecturing: webinars, e-portfolio). The E-learning Commission has helped teachers, particularly during the pandemic, by providing information on various [webinars](#) organised by the European Distance and e-Learning Network (EDEN) or by Srce, and through personal experience with the use of ICT in teaching. Prior to the academic year 2020/2021, the Faculty held the [workshop](#) about platforms Teams, Zoom, and WebEx, and on various application possibilities of the system Merlin in the teaching process.

Field lectures are organised for students within individual courses, usually in the form of visits to industrial facilities, such as the visits to the company Pre-kom, a city utility company from Prelog or to the company Tehnix in Donji Kraljevac. Field learning is financed from the Faculty's funds.

Internship is another integral part of all Faculty undergraduate and graduate study programmes, conducted through industry internship as described in the Section II.6. Internship is conducted at the Faculty's practice facilities, but also through practical exercises in laboratories. Senior students participate as demonstrators to help students with laboratory exercises and with the preparation for exercise-related exams.

In the academic year 2020/2021, internship was introduced as a compulsory course in the graduate study programme Chemical Engineering, and as elective course in other graduate study programmes. Through the practice at facilities established under the project CeSaR, students gain additional practical skills and competencies required by the labour market.

Teaching methods evaluation is conducted through student surveys. The student survey for the evaluation of teachers' work contains the section regarding teaching methods and is conducted online, in the last two weeks of each semester, using the system ISVU. On the Faculty website, students are [invited](#) to complete the survey. In line with the circular survey plan organised by the University, every teacher is evaluated once every four years,

using the traditional “paper-pen” survey. Teachers can view survey results in the ISVU, whereas processed survey data are submitted to the head of Faculty of Quality Management Commission. Survey results are discussed by the Quality Management Commission and the Education Commission and presented to the Faculty Council. Teachers are invited to consider all aspects of survey results, including students’ remarks regarding teaching methods.

Teachers evaluate their own teaching work through the [Teaching Self-assessment Form](#), which encompasses teaching, motivation, and communication skills, as well as preparation and organisation skills (Method development and execution plan). In 2019/2020 an [online assessment](#) of distance teaching was conducted designed by the Quality Management Committee. The self-assessment is conducted upon the invitation from the Quality Management Commission, which combines and analyses collected results.

The Faculty endeavours to adjust the teaching process and examination to students with disabilities and learning difficulties. Upon the recommendation of the University Office for students with disabilities, the Education Commission reviews and the Vice Dean for Education issues the Decision on adjustment of teaching process to a student, in accordance with learning outcomes and relevant evaluation of students. For example, students included in the University recommendation for the adjustment of teaching process have the right to extended time for written exam (up to 50%) or to graphically adjusted questions (double-spaced, font 14, for students suffering from dyslexia or dysgraphia), facilitating thus the achievement of the expected learning outcomes. The decision is submitted to the University in accordance with the [Protocol for the recommendation on the adjustment of teaching and examination processes](#). The Co-ordinator for students with disabilities and the Faculty representative also participate in providing support to students.

Teachers encourage students to work on scientific and professional research as part of their final or graduate thesis, and papers competing for the Rector’s or Dean’s Award, by publishing articles and papers at conferences and in professional magazines, written together with students. Through the participation in such activities, students gain independence and responsibility.

Seen that the Faculty teachers participate in student associations’ projects, they motivate students to engage in such projects with their knowledge and advice, both as part of a regular study programme and in extracurricular activities. The Faculty Management supports the work of student associations in terms of finance and facilities resources, as follows:

- Students participate in the work of the Faculty Student Council and independently organise their contribution in the science and sports competition of chemical technology faculties – “Tehnologijada” (ChemTech Olympics). The Faculty fully funds the participation of its students at this event. The Faculty Commission on students’ scientific activities, appointed by Dean, evaluates all submitted papers and classifies them according to the criteria. The most successful students present their work in the scientific part of “Tehnologijada”.
- The Faculty Student Council conducts the project “Buddy” where senior students assist first-year undergraduate students with advice on how to prepare for exams. During the pandemic, students prepared video materials in Stoichiometry as part of the project Buddy, and the Faculty ensured appropriate facilities.
- The Student Council organises each year a humanitarian Christmas fundraising event for those in need.

- The Faculty students participate in the activities of the student section of the Croatian Society of Chemical Engineers (HDKI), in the organisation of student conferences, contribution in student magazine “Reaktor ideja” (Reactor of ideas), and conduction of workshops aimed at bringing science and STEM closer to the public. The student section of HDKI and the Faculty Student Council organised the first student congress “e-SKIM” in 2018, co-financed by the Faculty.
- Students participate in fairs (for example AICHEMA) and conferences (SMLKI, HSKIKI), presenting their scientific work in the form of poster presentations or as complete works, also funded by the Faculty.
- Students are encouraged to venture into entrepreneurship in the field of STEM, and can therefore apply to the Faculty standing tender, in line with the [Ordinance on assigning support for the promotion of entrepreneurship in the field of STEM](#).

The Faculty rewards successful students, and their scientific, professional, and socially beneficial achievements:

- On the Faculty Day, at the session of the Faculty Council, Dean's Science Award is awarded to students. Dean assigns the award based on the ranking list of the Commission for Student Science work, applying criteria same as for the Rector's award.
- Upon the completion of their undergraduate or graduate study programmes, best students are praised with Latin commendations (*cum laude*, *magna cum laude* and *summa cum laude*). Aside from this, the most successful graduate students receive financial rewards from the industry sponsor. In the past five academic years, the Faculty's 90 students received 52 Rector's awards for scientific research and 88 Dean's awards. Students are thus encouraged to adopt excellence and develop competitive qualities, autonomy, ethics, and responsibility.
- In the past three years, Dean submitted students' applications for the Rector's award in the category Socially beneficial activities in academic and wider community. A total of 71 Faculty students received four (4) Rector's awards in the past three years for their participation in four projects, which encourages students to engage in volunteering activities.
- Students' achievements realised through extracurricular activities are registered in the diploma supplement, upon the approval of the University of Zagreb.

III.4 The Higher Education Institution ensures adequate support to students

The Higher Education Institution provides consulting on study programmes and career opportunities to its students (e.g., tutors, mentors, and other advisors who are assisting students with learning and progress).

The Higher Education Institution has implemented functional procedures for students' professional orientation, psychological and legal advising, support to students with disabilities, assistance with outgoing and incoming mobility programmes, library and student services, and informs students about such services.

Support to students considers diverse student population (part-time students, older students, foreign students, under-represented and vulnerable groups, students with difficulties in learning and advancing with the studies, and similar).

The Higher Education Institution employs an adequate number of qualified and committed professional, administrative, and technical personnel.

Vice Dean for Education and Admissions Office personnel advise students on issues relating to studying, the Faculty Secretary advise them on legal issues, and heads of the study programmes, Co-ordinator for student support, teachers through [consultations](#) and

mentoring, members of the Faculty Management and Dean all help them on relevant issues. The [ECTS Information Package](#) provides all information regarding the execution of programmes, learning outcomes, evaluation methods, teaching schedule, exams schedule, and similar.

In the academic year 2020/2021, the Faculty established the [Advisory and Students' Career Development Centre](#) (CeSaR), where students can attend soft skills workshops (Communication skills, Leadership for women, Job hunt preparation), and gain additional practical competencies at the newly established practice centres.

The University of Zagreb [Student Support Office](#) provides support with the improvement of existing and development of new competencies and organises training on two topics: Group A deals with topics concerning the development of academic skills, whereas Group B focuses on career development. The Faculty through its website regularly informs students on such training.

In co-operation with the [student section of Croatian Society of Chemical Engineers](#), the Faculty organises “[Business week](#)”, an event where companies advise students on scholarship and employment opportunities.

The Faculty of Chemical Engineering and Technology does not conduct part-time or professional studies, but only regular university study programmes.

The Faculty has implemented systematic support to students in the following areas:

- The Faculty has appointed a co-ordinator for students with disabilities, responsible for helping students with disabilities and to students with difficulties in studying. Detailed procedures and support protocol for disabled students are described in Section 3.5.
- The Faculty supports horizontal and vertical internal mobility and the [international mobility](#). International mobility is achieved through agreements concluded by the Faculty with foreign higher education institutions as part of programs Erasmus+, CEEPUS, Academic Mobility and Bilateral interuniversity student exchanges. Vice Dean for Science and International Co-operation, the Office for International Co-operation personnel, and the ECTS Co-ordinator advise students on mobility. Students [are informed](#) about calls on mobility for students, teachers, and non-teaching staff via the Faculty and University website, the Office for International Co-operation which collaborates with the University of Zagreb, the [University Central Office for International Co-operation](#), and through authorities in charge of the execution of mobility programs. The [list of courses](#) (21) conducted in English language is published on the Faculty and the University websites, aiming prevalingly at incoming mobility. The Faculty also offered online execution of [six courses](#) held in English, as part of the project [UNIC – University Post-industrial Cities](#). The records of incoming students are maintained by the Admissions Office, supported by the provision of information and in the application for their residence permit in the Republic of Croatia.
- The Faculty informs undergraduate students about STEM scholarship opportunities. To enter data in the ISSP system for purposes of scholarship, the Faculty requests consent from students. Students are also informed about the opportunities to apply for University of Zagreb scholarships.
- [The Library and Information Centre \(BIC\)](#) is a higher education library that provides information support to the Faculty's scientific and educational activities through its library materials and services. It is intended primarily for employees and Faculty students but is also open to external users who require literature in the field of natural

or technical sciences. Students can seek assistance from BIC Manager in finding relevant sources on daily basis. The adjacent area is equipped with several desktop computers which students can use to search and study [literature in free access](#). The BIC also contains literature mandatory for the execution of study programmes. Along with standard reference literature (dictionaries, encyclopaedias, manuals, lexicons, and similar), most of the library material consists of scientific and professional publications in the field of technical and natural sciences, such as Chemical Engineering, Chemistry, Environmental and Material Engineering. The library material is modernised through the continuous acquisition of new scientific and technical literature. Information regarding library operations is published on the Faculty's website. Users can access a large number of books and magazines [databases](#) and collections, through the [Portal of electronic sources](#) for the Croatian academic and scientific community.

- For technical issues related to the ISVU system, computer classrooms, and similar, students may contact ISVU Co-ordinator or CARNet Co-ordinator. Prior to the admission, ISVU-Co-ordinator opens AAI@EduHr accounts for the first-year undergraduate students (Authentication and Authorization Infrastructure of the Croatian Science and Higher Education System), along with their e-mail account, maintained by the CARNet Co-ordinator throughout the study.

Students can learn about the services available at the Faculty through the [contacts](#) published on [the Faculty's website](#) (Dean's Office, Admissions Office, Library, [Departments](#)). Furthermore, each year after admission, an introductory lecture is organised for first-year students, where they can learn about the rules of study, general Faculty and University acts, rights and obligations of students, and similar. The Faculty management, administration personnel, first-year teachers, Co-ordinator for student support, University of Zagreb University Computing Centre (Srce) representatives, and head of the University Student Support Office are presented to the first-year students. At the opening session, students receive their AAI@EduHr account data, whereas the [presentation of the opening session](#) is published on the website. All vital information is available to students also through the [announcements](#) published on the Faculty website.

A significant number of administrative employees takes care of students:

- Four employees of the Admissions Office: Admissions Office Manager (university degree), two administrators of undergraduate and graduate study programmes (high school degree), and one administrator of post-graduate study programmes (high school degree). Working hours of the Admissions Office are Monday to Friday from 8 AM to 4 PM. The Admissions Office also uses e-mail for a daily communication with students.
- Two employees of the Office for International Co-operation: Office Manager (Ph.D. degree) and an administrator (high school degree). The opening hours of the Office are Monday to Friday from 8 AM to 4 PM.
- Library manager at the BIC (Ph.D. degree), who has the opportunity to develop his/her professional training through lectures at the [Permanent Professional Development Centre](#) (CSSU).
- Two information infrastructure administrators (university degree) provide technical support regarding the ISVU system, who have the opportunity to develop their professional training through courses organised by CARNet and Srce.
- The Faculty employs qualified and professional administrative and technical staff. The Faculty Management ensures that all employees are entitled to professional training, seminars, courses, and similar.

Every year students and Faculty employees take a satisfaction survey regarding the work of administrative and technical services. The results of conducted surveys are presented at the Faculty Council session.

III.5 The Higher Education Institution ensures support to students from vulnerable and under-represented groups

The Higher Education Institution monitors the needs of students from vulnerable and under-represented groups.

The teaching process is adjusted to the individual needs of students from vulnerable and under-represented groups.

The Higher Education Institution invests resources into support for students from vulnerable and under-represented groups.

Since the establishment of the University of Zagreb [Office for Students with Disabilities](#), the Faculty has adopted systematic care about students with disabilities and learning difficulties, with the assistance of the [Co-ordinator](#) for students with disabilities, Co-ordinator for student support, and Vice Dean for Education. The teaching process is adjusted to individual needs of students from vulnerable and under-represented groups, based on the recommendations of the University Office for students with disabilities, and in accordance with the [Protocol for the recommendation on the adjustment of teaching and examination processes](#), as indicated in the previous standard. The decision on the adjustment of the teaching and examination processes is issued by Vice Dean for Education, about which course teachers and assistants are being informed. Students' data are maintained in accordance with the law on Protection of Personal Data.

The Co-ordinator for students with disabilities is in constant contact with the University of Zagreb Office for students with disabilities. The Co-ordinator advises students with disabilities and those with learning difficulties, collects and analyses documentation, and informs Faculty teachers and experts. Upon student's request and with the approval of the [student physician](#), assigned to the Faculty, the University of Zagreb Office for students with disabilities sends to the Vice Dean for Education the recommendation for the adjustment of teaching and exam processes. Based on the Office recommendation, student physician medical certificate, and further consultations, when necessary, with the competent student physician and upon considerations made at the Education Commission, the Vice Dean for Education issues the Decision on possible adjustments and duration of adjustment. In accordance with the [Protocol for the recommendation on the adjustment of teaching and examination processes](#), the Faculty issues [the Decision](#) with recommendations on the adjustment of teaching and examination processes, which students submit to teachers before lectures or exams. Two Faculty students are currently in the possession of a Decision on adjustment of teaching and examination processes. From the academic year 2011/2012, students may enrol in the university elective course [Peer Support to Students with Disabilities](#) (5 ECTS, one semester). The course is owned by the University of Zagreb and executed at the Faculty of Education and Rehabilitation Sciences of the University of Zagreb. The course is based on individual plans jointly adopted by the attending student and the student with disabilities. The course is conducted in two parts: preparatory workshop and peer support, with regular monitoring and evaluation. The admission requirement for this course is to know the student with a disability, visual impairment, hearing or motor disorder who needs peer support and who agrees to be supported by the student admitted to the course. The student providing support must be from the same study programme and the same year. The call for admission to this elective course is publicly published on the

Faculty website. For psychological counselling, students can contact the University [Student Office](#).

For students from families of lower social and economic status, there are no relevant competent state authorities' decisions on quotas or admission criteria or different payment treatment other than those based on the Croatian Government Decision and the University of Zagreb instructions on the unique payment treatment. The Faculty considers, when possible, the social and economic students' status. Every year, the Faculty issues a [Call for application for the payment exemption](#), granted to 20 students with lower social and economic status. In accordance with the Ministry of Science and Education recommendation, students from the area of Sisak and Moslavina County affected by the earthquake were exempt from payment in the academic year of 2020/2021.

Pursuant to article 12 of the [Ordinance on the Faculty undergraduate and graduate study programmes](#), students have the right to temporarily suspend their rights and obligations during pregnancy, paternal or maternal leave until the child turns one year old, as well as because of illness lasting a longer period of time (more than three months), which prevents students from the fulfilment of their student obligations. To such students, a [decision](#) is issued on temporary suspension of their rights and obligations, maintaining the right to take exams for which they have obtained necessary requirements.

Pursuant to the law, children of the Croatian fallen war defenders can be admitted to the studies outside the admission quotas and criteria.

III.6 The Higher Education Institution facilitates international experience opportunities

Students are informed about the possibility to attend part of their studies abroad.

The Higher Education Institution provides support to students with applying and attending exchange programmes.

The Higher Education Institution ensures acknowledgment of ECTS credits acquired at another Higher Education Institution.

The Higher Education Institution collects information on students' satisfaction with the Higher Education Institution's support quality in practical issues of student mobility.

Students gain the competencies necessary to work in an international environment.

In 2018, the Office for International Co-operation was established to strengthen mobility and international co-operation through international projects and to support teachers and students in applying for international projects. Students can participate in [international exchange programmes](#) or [internships](#), where the achievements are [acknowledged](#) in accordance with the [Ordinance on mobility of the University of Zagreb](#). International mobility opportunities are announced at [the Faculty](#) and [the University websites](#). Students participating in the exchange programme Erasmus+ receive financial support provided by the Agency for Mobility and EU Programmes, or by the European Commission, covering thus a part of the expenses. The Faculty finances travel costs for students participating in the outgoing mobility. Students participating in the exchange programme Erasmus+ can leave at their own expense, i.e., without financial support (*zero-grant*), exercising the same rights and obligations as students who have been awarded the financial support.

Upon student's request and with valid proof of activities undertaken, the achievements acquired in extracurricular activities in Croatia or abroad are analysed by the

University of Zagreb [Working Group for acknowledgment of ECTS credits](#) in accordance with the [Ordinance on assigning ECTS credits for extracurricular activities](#). Upon their approval, achievements are [acknowledged](#) as a substitution for a course of the study programme or as an additional activity. The information is entered in the ISVU system upon the approval of the ECTS Co-ordinator and the Vice Dean for Education and registered in the diploma supplement. Student achievements gained at foreign institutions under international exchange programmes are acknowledged in accordance with the learning agreement, and entered into the ISVU system, upon the approval of the ECTS Co-ordinator and Vice Dean for Education.

Over the past five years, 92 students took the opportunity of outgoing mobility under the programme Erasmus+ (Table 3.6 of the Analytical Supplement), which is a significant improvement with respect to the previous reaccreditation period. The University of Zagreb collects data regarding student satisfaction with the quality of higher education institution support and practical issues of student mobility through an anonymous survey followed by the report on the mobility achieved under the programme Erasmus+. Several students who went abroad for studies or internship subsequently got employed abroad. To the others, the international environment and experience helped to find a job in Croatia. Students with special needs can find information regarding the accessibility of higher education institutions and their services on the websites [ExchangeAbility](#) and [EIAE Platform Access and Diversity](#). The programme Erasmus+ pays significant attention to directing, accepting, physical accessibility, pedagogical and technical support, and financing additional expenses for students whose physical, mental, or health circumstances require additional financial support. Students with special needs are entitled to an increased amount of financial support due to potentially increased mobility expenses. Considering that since 2015, language skills must be assessed for purposes of the programme Erasmus+, the University of Zagreb offers [foreign languages examination](#) through the platform [Erasmus+ Online Linguistic Support \(OLS\)](#). The Faculty undergraduate students take a compulsory English language course in the first four semesters of their studies.

Excellent students are awarded the financing to attend international fairs or conferences ([Dean's report](#)), participating in scientific programmes as co-authors of the poster announcements, along with their mentors.

Since the academic year 2020/2021, the Faculty participates in the execution of the project UNIC – the University of Post-industrial Cities, which allows Faculty students studying at institutions abroad to enrol [courses offered](#) within the project. These courses can be acknowledged provided that learning outcomes contribute to the learning outcomes and grades of the Faculty study programme and subsequently registered into the ISVU system.

III.7 The Higher Education Institution ensures favourable conditions to foreign students

Foreign students can access the information on admission and study opportunities in a foreign language.

The Higher Education Institution provides support to foreign students with the application and during studying at the domestic Higher Education Institution.

The Higher Education Institution collects feedback on the satisfaction and needs of foreign students.

Foreign students can attend classes in a foreign language (English).

Croatian language courses are available to foreign students at both the constituent and university levels.

The Faculty ensures favourable conditions to foreign students. Foreign citizens can enrol in study programmes in Croatian language within quotas defined for foreign students. EU students are not considered as foreign. Since the academic year 2019/2020, in partnership with the Faculty of Chemistry and Technology of the University of Split, the graduate study programme conducted in English entitled [Chemical and Environmental Technology](#) (CET) is being conducted. The programme was established as a part of the project with approved financing offered in the Call for internationalization of higher education (European Social Fund — Operational program Effective Human Resources 2014 – 2020)

The information to foreign students regarding admission to the programme CET is available in English on [the Faculty's web page](#) and in the promotional brochure.

Persons in charge of supporting foreign students with the admission and during the study are Vice Dean for Science and International Co-operation, Vice Dean for Education, and Admissions Office personnel. The admission form and all relevant information are accessible on the Faculty web page. Upon the completion of ranking, foreign students receive assistance with obtaining a visa and ensuring lodging in the student dormitory, and with other administrative issues, as necessary.

Foreign students admitted to the Faculty in the context of international mobility can find on the [University of Zagreb](#) and [Faculty websites](#) relevant information in English language regarding the studies. For several years, the Faculty fosters the practice of organising certain courses in English language, and the visiting foreign students can find such information in English. Currently, there are 21 courses in undergraduate and graduate programmes of studies conducted in English language. Furthermore, all interested visiting students may enrol in the CET programme, conducted in English in the winter semester. The CET programme courses are offered as part of the international mobility of the project UNIC.

All visiting students attend courses held in English language. In the previous five-year period, 16 students from 8 countries and 9 institutions participated through the programme Erasmus+, whereas 17 students participated through bilateral agreements. Visiting students can perform scientific and research activities as part of the preparation of their graduate thesis. Vice Dean for Science and International Co-operation, Vice Dean for Education, and Admissions Office personnel provide support and assistance to foreign students regarding the visit and the necessary documentation. Over the past five years, 31 foreign students completed their internship at the Faculty as part of the programme Erasmus+. However, part of the agreed internships was cancelled because of the coronavirus pandemic.

At the end of the academic year 2020/2021, the Faculty conducted a survey, where the first generation of students who graduated in programme CET study evaluated their satisfaction with the study. The Quality Management Commission shall analyse the survey results and the survey shall be organised every year. The Faculty thus far did not systematically collect the information about the satisfaction of visiting students, considering that such data are collected by the University of Zagreb Central Office for International Co-operation, but it has been planned to conduct the survey in the coming years.

The University of Zagreb ensures Croatian language courses for foreign students, through the programme [Croaticum – Centre for Croatian as a Second and Foreign Language](#) and the [University School of Croatian Language and Culture](#). Over the past five-year period, 139 international mobility programmes with a duration of over three months and one under three months were conducted.

III.8 Higher Education Institution ensures objective and consistent evaluation and grading of student achievements

The evaluation and grading criteria and methods are clear and published prior to the execution of courses.

The evaluation and grading criteria and methods are consistent with the adopted teaching methods.

The Higher Education Institution provides support in the development of testing methods skills to all evaluators.

The Higher Education Institution ensures grading objectivity and reliability.

When possible, the Higher Education Institution conducts the grading assessment.

Evaluation procedures consider specific circumstances of certain groups of students (adjustment of examination procedures, e.g., for students with disabilities), ensuring at the same time the achievement of the expected learning outcomes.

Students receive feedback on evaluation results and, if necessary, learning process advice.

Because of different course exit competencies, learning outcomes are evaluated through different forms of knowledge evaluation, including continuous evaluations (written mid-term exams, interrogations, homework, e-learning homework, quizzes, laboratory exams), preparation and presentation of seminars and projects, reports on field studies and internships, written exam, oral exam, or a combination. Course teachers present to students at the introductory lecture, the criteria and methods of assessment and grading of student work. This information is contained in the [ECTS Information Package](#), published on the [relevant course web page](#), and accessible through the e-learning system [Merlin](#). The Faculty is an institutional user of the Merlin system and all courses performed under undergraduate and graduate programmes are also available at Merlin.

The methods of evaluation and grading are defined in the [Faculty Statute](#), [Studying Ordinance](#), [Ordinance on preparation and discussion of graduate or final thesis](#), and other University of Zagreb and Faculty acts.

Teachers may attend workshops on learning outcomes verification and evaluation methods, as stated in Section III.3 above. Teachers can continuously educate themselves through [courses and workshops](#) on learning outcomes and evaluation, organised by the E-learning Centre.

The objectivity in written exams is ensured by distributing an [identical exam](#) or different exams with questions of identical importance, with the supervision of the assistant or course teacher. The fourth exam is held in front of [three-member committee](#). The results of written and oral exams are public, [published](#) in line with the GDPR requirements, omitting their names and indicating only their JMBAG (Unique Academic Citizen Registration Number). When partial or mid-term exams are taken in a course, the grade is assigned based on a total score and the evaluation method is defined by the course teacher. In the event where a student is not satisfied with the grade, he or she has the right to appeal in accordance with article 36 of the [Statute](#) and article 25 of the [Undergraduate and Graduate Studying Ordinance](#). Students have the right to give his or her [statement of appeal](#) before the Commission, provided that a justified request for a new examination has been submitted to Dean in writing, at the latest within 24 hours after the communication of the grade. A new exam is organised within three days from the submission of the request. Dean appoints a three-member Commission within 24 hours from the request receipt, where one teacher must be the course teacher and one teacher must be from a different Faculty department. The Commission has the obligation to keep a record of the examination, containing the final

grade decision. The Commission adopts the decision by the majority of votes and the record is submitted to the Dean.

Adjustments of teaching and examination processes are available for students with disabilities, in accordance with the university [Protocol for the recommendation on the adjustment of teaching and examination processes](#). The Faculty Quality Management Board analyses student survey results ([p. 7 of the Minutes of the 219th session of the Faculty Council](#)), whereas the Education Commission and the Faculty Management, in co-operation with the Admissions Office continuously monitor the passing rate of exams.

For students with disabilities and students with speech and writing disorder to whom [a Decision](#) on adjustment of examination process was issued, the adjusted procedure applies (50% longer time to write partial or final written exams, and double-spaced, font 14 text, for students suffering from dyslexia or dysgraphia).

Teachers have the obligation to inform students about the exam evaluations through [public announcements of the results](#) and, upon request, provide insight into the written exam. Students who did not pass the exam are advised by course teachers on how to achieve learning outcomes and how to efficiently learn in order to achieve such outcomes.

III.9 The Higher Education Institution issues diploma and diploma supplements, in accordance with the relevant regulations

Upon the completion of studies, students receive appropriate documents (diploma and diploma supplement).

Diploma and diploma supplements are issued in accordance with the relevant regulations.

The Higher Education Institution issues diploma supplements free of charge, in Croatian and English language.

Upon the completion of undergraduate and graduate study programmes, the Faculty issues relevant [diploma and diploma supplement](#).

A diploma supplement is a public document issued in Croatian and English, enclosed to diploma on completion of an undergraduate or graduate study, for purposes of providing detailed insight into the level and content of studies and the Faculty system and regulations. The supplement is issued in accordance with the Science and Higher Education Act (official gazette "Narodne Novine" no. 123/2003, 105/2004, 174/2004, 02/2007, of the Republic of Croatia Constitution Court Decision 46/2007, 45/2009, and 63/2011), article 84, paragraph 5, and in line with the [instructions](#) of the Ministry of Science and Education of the Republic of Croatia, and article 8 of the [University of Zagreb Ordinance on Studying in Undergraduate and Graduate Study Programmes](#), and article 27 of the Faculty [Studying Ordinance](#).

The diploma supplement (addition to a diploma) contains:

- information on diploma owner (name and surname, date and place of birth, student ID number)
- information on acquired qualifications (qualification title in Croatian language and in language in which it was acquired, main areas of study, title, and information on legal status of the higher education institutions executing study programmes, title and information on legal status of the higher education institutions issuing qualifications, language in which the study was conducted)
- information on the qualification level (qualification degree, duration of programme, educational level required for admission)

- information on the content and results of the acquired qualification (programme execution methods, a regulation governing the approval of the study programme, basic information on the study programme, evaluation system with grades and average grade achieved, title and grade of final or graduate thesis, level acquired, and eventual commendation – summa cum laude or similar)
- information on employment opportunities or inclusion in further study programmes
- additional information (awards and similar)
- authentication of diploma supplement (signatory name and surname, date and place of issuance and stamp)
- information on the higher education system in the Republic of Croatia (structure of the overall education system, information on higher education system degrees, sources of information on the higher education system).

Legal status of the higher education institution and the study programmes, languages in which studies are conducted, the educational level required for admission, estimated duration of the study, and level of study programme qualification are registered in the ISVU system. Diploma is issued at the promotion, without an additional fee, whereas copies are charged.

The Ministry prescribes the content of the diploma supplement, and the University of Zagreb Senate prescribes its form.

III.10 The Higher Education Institution takes care of the employability of students after their studies

The Higher Education Institution analyses the employability of graduated students.

Admission quotas are consistent with social needs and labour market needs and Higher Education Institution resources.

The Higher Education Institution informs future students on possibilities for education continuation or the employment after the completion of studies.

The Higher Education Institution provides support to students with planning their future careers.

The Higher Education Institution maintains contact with its former students.

The Faculty continuously monitors and [analyses](#) the employability of graduated students according to the information available at the Croatian Employment Service (HZZ), and from direct contacts of teachers and graduated students, as indicated in Section 2.1 of the Self-analysis According to the Croatian Employment Bureau data available for the past three years (Table 3.7 of the Analytical Supplement), only two bachelors were unemployed, because most of them continue with their studies at graduate study programmes at the Faculty or other university constituents. The number of unemployed holders of master's degree according to the statistics of the Employment Bureau at the national level is 75. This information is classified according to study programmes and previous work experience and is presented pursuant to the National Standard Education Classification (NSKO, official gazette "Narodne Novine" no. 105/2001), harmonised to the ISCED-97 (International Standard Classification of Education), and includes programmes completed based on the Bologna education process. The unemployed rate monitored over the years is steady, which indicates the labour market need for experts graduated from the Faculty. The Faculty offers broad education, which facilitates employment in many different industry companies,

public services, institutes, and laboratories, depending on candidates' interests and capabilities. Detailed information can be found on [the Faculty web page](#).

The most important criteria considered when proposing admission quota for undergraduate and graduate study programmes are social needs (primarily in the economy) and the existing resources in terms of facilities, technology, and people, necessary for quality teaching. The number of students for individual study programme is also estimated based on previous admission and general social development data. The situation is also monitored in related institutions that offer educational services in the field of chemical engineering and technology in the region and in the European Union. Admission quota for undergraduate and graduate study programmes is adopted by the Faculty Council, which is in line with the admission quota adoption procedure and therein announced criteria for admission quota proposals, issued by the University of Zagreb Senate for each academic year. The admission quota adoption procedure is in line with the Act on Science and Higher Education Quality Assurance, the Ordinance on evaluation of undergraduate, graduate, and integrated study programmes of the University of Zagreb, the Ordinance on the authorisation content and requirements for the issuance of authorisation for the execution of higher education activities, study programmes and for the higher education institutions' reaccreditation by the Ministry of Science and Education.

The Faculty informs its students about the possibilities for further education and employment through promotional [brochures](#) published on the website, the University of Zagreb Exhibition, promotional videos, presentations in high schools, and similar. The Faculty regularly publishes on its website job ads from companies offering employment and organises [Business week](#), an event where former students represent their companies and employment opportunities.

In 2021, the Faculty established the [Advisory and Students' Career Development Centre](#) (CeSaR). One of the Centre objectives is to help students in the early development of their careers and with their employment upon the completion of studies.

The Faculty graduated students (*alumni*) gather through the Society of Graduated Engineers and Friends of Chemical and Technological Studies ("[AMACIZ](#)"), active for the past 30 years. The association organises singing choir, hiking, arts, sports and innovation activities. AMACIZ regularly issues its publication "Glasnik AMACIZ-a" and organises scientific and professional members' meetings. Since the academic year 2013/2014, the Faculty registers all graduated students in AMACIZ and finances their one-year membership, as an incentive to engage in the activities of the association.

[The Croatian Society of Chemical Engineers](#) (HDKI) brings together current and former Faculty students, chemists, chemical engineers, and technologists and organises conferences, meetings, consultations, roundtables, presentations, and similar. Through such activities the Faculty maintains contact with its former students.

IV. Teaching and Institutional Capacities

IV.1 Higher-education institution provides adequate teaching capacities

The number and qualifications of teachers are suitable for the implementation of study programmes, acquisition of the intended learning outcomes and the performance of scientific activities.

The ratio of students to teachers permanently employed at the higher-education institution is appropriate for quality study.

Teacher workload is in accordance with applicable laws and bylaws, acts of competent authorities, collective agreements, and the like.

Teacher workload ensures an even distribution of teaching duties, scientific/artistic work, professional and personal development, and administrative duties.

The teachers are qualified for the course/courses they teach.

At the Faculty of Chemical Engineering and Technology (Table 4.1.a of the Analytical Supplement), 65 employees (28.0%) elected to the academic rank were involved in teaching, of which 18 tenured full professors (permanent rank) and two *professors emeritus*, 16 first-time full professors (first election), 16 associate professors and 13 assistant professors. Additionally, five employees (2.2%) elected to the teaching rank, of which four senior lecturers, one lecturer, two professional associates in the science and higher education system and six scientific associates also participated in teaching. Furthermore, 13 postdoctoral researchers and 80 assistants-doctoral students (40.1%) were employed in academic year 2020/2021.

The total number of employees on 30 September 2021 was 219 (Figure IV.1), which, in addition to the above-stated academic, teaching, and associate ranks (33.8%) encompasses non-academic positions (46.6%) and support and administrative staff (19.6%). As can be seen from the above-stated, full professors with extensive experience in science and teaching make up most of the academic rank so the qualification structure can be assessed as very satisfactory. A large number of doctoral students and post-doctoral scholars (39.3%) who participate in teaching (they are employed to a lesser extent on research projects, and to a greater extent on teaching positions of assistant – doctoral students), laboratory exercises and practice-based courses (e.g. Chemical Engineering Laboratory, Materials Engineering Laboratory, Environmental Engineering Laboratory, Final Thesis, Graduation Thesis) also contribute to this assessment.

In the period from 2016 until 2021 (Table 4.2. of the Analytical Supplement), due to retirement and the use of the so-called development coefficient, eleven assistant professors were employed, selected among the best post-doctoral scholars in the areas in which the Faculty operates. At the same time, an increasing number of doctoral students were employed on research projects (41) which significantly increased the teaching capacity considering the provisions of the collective agreement, which stipulate compulsory participation in teaching for your researchers at higher education institutions. For the same reason, the total number of employees increased, with doctoral students and post-doctoral scholars making for the largest group today.

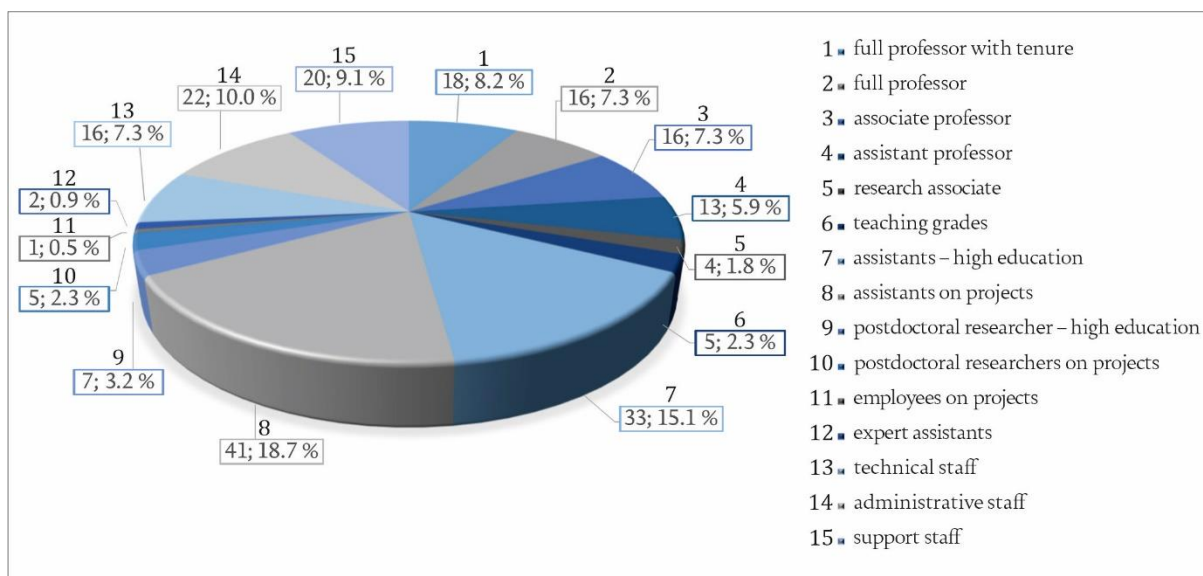


Figure IV.1. Employee structure by type and share in the overall number of employees

In addition, it should be noted that all undergraduate and graduate study programmes are executed using Faculty's own teaching potential, with the exception of specific courses in which prominent experts in the field participate (Table 4.4. of the Analytical Supplement) – in the course Innovation-based Entrepreneurship, Prof. E. Meštrović, Ph.D., (long-term, research commercialisation manager in pharmaceutical companies Teva-Pliva, Xellia) is an external associate. There is a greater number of external associates and teachers from other Faculties at courses of the doctoral study programme, as well as the university specialist postgraduate study Environmental Engineering due to the above-mentioned reason. Accreditation of the doctoral study programme was carried out in 2018, whereby it was awarded a high quality label by the expert commission.

The Faculty overall enrolment quota for the first year of all undergraduate study programmes (three-year programmes) is 220, and for graduate study programmes (two-year programmes) is 160. The total number of undergraduate and graduate students is around 1100. The ratio of students to teachers in academic ranks is 18:1 while the ratio of students to teachers in academic and teaching ranks is 16:1. When one adds assistants to teachers, the ratio is 9:1. The ratio of students to the overall employed staff is 5:1. It is clear that the greatest teacher workload is in the first years of study programmes. However, it is evident from the data that the ratios allow for teaching in small groups. Teaching is often conducted as mentoring in small laboratory groups thus making mentoring considerably present.

Taking into consideration the favourable teacher-student ratio and a high number of courses, as well as the conditions of the [existing](#) and previous collective agreements, a policy of balanced and even teacher workload has been implemented for many years. Teaching duties are assigned on the level of individual departments and then discussed (for [undergraduate](#) and [graduate](#) studies) and [confirmed](#) by the Faculty Council for each subsequent academic year. After the end of active teaching, a [report on teaching load](#) is prepared for each semester and for the overall period, which is confirmed at the session of the Faculty Council. In this document, the [teaching load](#) is presented in working hours in accordance with the provisions of the valid collective agreement as well as in standard hours in accordance with the [Act on Scientific Activity and Higher Education](#). The annual reports show that the teacher load is fully compliant with applicable regulations and the provisions of the Collective Agreement, i.e. there is no need for overtime teaching hours. Certain

variances in teaching load can be noticed for some teachers or employees. According to statutory teaching time, the values range from 215 to 514 teaching hours, but mostly fall within the preferable 300±60 statutory teaching hours. Variances occur due to irregular enrolment of students in elective courses, gradual introduction of younger teachers – assistant professors to teaching duties per individual courses, higher workload of individual teachers with scientific research and projects or are the result of time spent in training or sick leave. However, the influence of the policies of individual departments and historical circumstances can also be felt. In general, the teaching load enables research work and almost all teachers participate in scientific research necessary for advancement in academic ranks, too. However, due to a high number of research projects obtained and launched in 2020 and 2021 and [based on the analysis of total workload](#) for certain teachers, it will be necessary to reconsider the schedule and participation in teaching duties. The same is true for several teachers (two) whose scientific activity is unsatisfactory, i.e. very low compared to average values. However, it is important to emphasize that so far, with a few exceptions, no major imbalances have been reported.

The teachers have been elected to particular areas in accordance with teaching contents and study programmes as follows (Table 4.3. and Table 4.4. of the Analytical Supplement): technical sciences – chemical engineering (38), basic engineering (3), mechanical engineering (1), electrical engineering (1); natural sciences – chemistry (17), physics (2), mathematics (2). The area of technical sciences is predominant, field: chemical engineering, followed by the area of natural sciences, field: chemistry. However, there are also less represented fields with a smaller number of teachers who teach courses outside the main areas of activity – physics, mathematics, mechanical engineering, electrical engineering. The qualification of teachers for the courses they teach is emphasized by outstanding scientific, and in some cases, professional contribution (Table 4.4. of the Analytical Supplement); a large number of scientific papers are published in journals cited in the Current Contents, Science Citation Index and Web of Science Core Collection databases (see chapter V.1). A large number of research projects (more than 30 in September 2021 or on average more than 0.5 per teacher in the research rank) as well as prestigious professional projects are being carried out; e.g. Analysis and Optimization of Systems for Automatic Process Control in plants of INA Rijeka Oil Refinery, Assessment of the Condition of JANAF Oil Pipelines and Crude Oil and Petroleum Products' Tanks – JANAF; Development Possibilities of the Chemical Complex for the Production of Ammonia and Artificial Fertilisers of Petrokemija d.d. and others. Furthermore, the qualifications have been indirectly confirmed by an independent external associate, [ITECH Lyon](#), (with the tradition of engineer education since 1899, with more than 500 students per year) which, in accordance with the signed contract, sends 30-40 students per year to attend lectures in polymeric materials and engineering at the Faculty for the whole winter semester. Successful cooperation has been taking place for the fourth consecutive year with continuous assessment and monitoring of teaching quality and success. The qualifications of teachers are confirmed by regular, and sometimes earlier elections to academic ranks, as well as by frequent publication of university textbooks, e.g.: *Osnove kemije heterocikličkih spojeva /Fundamentals of the Chemistry of Heterocyclic Compounds/* (T. Gazvoda Kraljević, M. Hranjec, 2020.), *Rendgenska difrakcija na prahu /X-ray Powder Diffraction/* (S. Kurajica, 2020.), *Modeliranje u kemijskom inženjerstvu /Modelling in Chemical Engineering/* (Z. Gomzi, Ž. Kurtanjek, 2019.), *Uvod u nanotehnologiju /Introduction to Nanotechnology/* (S. Kurajica, S. Lučić Blagojević, 2017.). The following books are in print or in preparation: *Uvod u mehaničko procesno inženjerstvo /Introduction to Mechanical Process Engineering/* (G. Matijašić, 2022.), *Automatsko vođenje procesa /Automated Process Control/* (N. Bolf, 2022./2023.), *Termodinamika realnih sustava /Thermodynamics of Real Systems/* (M.

Rogošić, 2022./2023.), Kvantno-kemijski račun /*Quantum Chemical Calculation*/ (V. Dananić, 2022./2023.). In addition to the above-stated, student surveys are conducted on a regular basis, and they include questions about qualifications of teachers for each individual course. The results obtained are excellent, with an average value of about 4.35. While it is doubtful whether students can adequately assess the qualifications of teachers, the results are still indicative and poor ratings would certainly suggest that there is a certain problem in teaching.

It is worth noting that excellent qualifications of teachers have been recognized in the wider environment due to the fact that some teachers teach at other faculties of the University of Zagreb (Faculty of Science, study programme: Mathematics), as well as at other universities: University North, University of Split, University of Dubrovnik, Croatian Military Academy (chemistry, chemical engineering).

IV.2 Employment, promotion, and re-election of teachers are based on objective and transparent procedures involving excellence assessment

Teacher recruitment procedures stem from the objectives of development of the higher education institution and are in line with the statutory regulations and internal acts.

The selection, appointment and evaluation of teachers take into consideration their previous activities (teaching activity, research activity, student feedback, etc.).

The procedures for advancement of teachers to higher ranks are based on evaluation and rewarding of excellence and take into account important achievements (e.g. international contribution to the discipline, prestigious publications, significant scientific discoveries, successful projects, obtained additional financing, mentoring, supervision of final papers and graduation theses, scripts, textbooks, popular lectures, etc.).

Excellence indicators include scientific, teaching, and professional work and contribution to the development of the higher education institution.

The higher education institution has in place appropriate methods for selecting the best candidates for each position, and, in addition to the prescribed national minimum requirements for each position, it has also prescribed additional criteria for evaluating excellence.

Additional criteria for promotion of teachers to higher ranks reflect the strategic goals of the higher education institution.

According to strategic goal 4 – To modernise the teaching process and thus raise its quality - and Measure 4.2. – To evenly distribute the teaching load – defined by the [Faculty's Development Strategy \(2015 – 2020\)](#), teaching capacities and needs are taken into account when employing new staff. The Faculty keeps records of the teaching load for each academic year and for each teacher and associate by using the Annual Teaching Load Tables filled in by the Departments and delivered to the Faculty Board and approved by the Faculty Council. These tables are part of the [Human Resources Management Plan](#), which is consolidated, discussed, and approved by the Senate for all faculties of the University of Zagreb.

In the event of additional teaching load, the Departments can submit a request to the Dean about the need to hire a new teacher. The Faculty Board, together with the Faculty Commission for Development Strategy and the Election Commission will make a proposal and submit it to the Faculty Council which will render a final decision. In the case of regular promotion or re-election, according to the provisions of the Act on Scientific Activity and Higher Education, the procedure may be initiated by a Faculty office. In addition, Faculty departments can submit a request for early promotion to the Dean. Such a request will be discussed by the Board, Commission for Development Strategy, and the Faculty Council. For new employments, regular (after five years) or early promotions, it is necessary to obtain a prior [consent from the University of Zagreb](#) (pages 9-10) and the [Ministry of Science and](#)

[Education](#) (page 11). Upon obtaining necessary consents and prior to announcing a vacancy, an Expert Election Committee is proposed which consists of three members, one of whom must not be a teacher at the Faculty. The proposal of the Expert Commission is approved by the Faculty Council. In case the candidates do not meet the requirements for being promoted to a higher rank or in case the Faculty does not have a coefficient at the moment, a re-election procedure is initiated.

The election to the academic rank is preceded by the election to an appropriate research rank. The election to the research rank is initiated by the Faculty or the candidate after which the Faculty Council will appoint an [Expert Commission](#) (page 16). When applying for research ranks, the scientific contribution of the candidate is evaluated in [the report](#) (pages 144-175), expressed primarily through the number of original scientific papers published in international journals (cited in the Web of Science Core Collection database) where the quartile and the factor of influence of an individual journal are taken into consideration, as well as the main authorship of a particular article. In addition, the [reports](#) list all other scientific contributions such as leading and participating in scientific projects, evaluations of scientific projects, reviewing scientific papers, awards, and recognitions for scientific work. When the favourable reports of the Expert Commission have been approved by the Faculty Council, they are submitted to the appropriate committee of the Agency for Science and Higher Education which makes the [Decision on the election to the appropriate research rank](#).

The vacancy is announced pursuant to Article 16 of the Faculty [Statute](#) and in accordance with Article 95 of the [Act on Scientific Activity and Higher Education](#), Article 84 of the University [Statute](#), and the [Decision of the Faculty Council](#) (page 12) on the approval for the initiation of the procedure for seeking consent for the election of one executor for the position in the academic rank. Public vacancy is announced in the official gazette *Narodne novine*, in the daily press, [Faculty's webpage](#), and on the official website of the European Research Area. The vacancy must be open for at least 30 days, after which the Expert Commission will prepare a report which will be discussed and corrected, as needed, by the Election Commission of the Faculty. The report is then approved by the Faculty Council. The results of the public vacancy are published on the [Faculty's webpage](#).

Elections to academic and teaching ranks are carried out pursuant to Article 16 of the Faculty [Statute](#) and in accordance with Article 95 of the [Act on Scientific Activity and Higher Education](#) and [Recommendations for election to academic, teaching, and associate ranks](#) of the Faculty. For elections to academic ranks, the scientific, teaching, and institutional contributions of candidates are evaluated, and teachers are evaluated through student surveys, as indicated in the [Decision on necessary requirements for the evaluation of teaching and scientific activities in the procedure for election to academic ranks](#) of the Rector's Assembly and the National Council for Science, Higher Education and Technological Development. Teachers' activities are listed in a report structured according to instructions received and the said report should be accompanied by a CV and other documents required for the application for vacancy. Part of the candidate's contribution is quantified through the criteria provided by the Rector's Assembly according to the following groups:

- A. teaching contribution criteria; mentoring, publishing papers with students, training in the scientific area or profession, publishing of books and textbooks, innovating teaching contents, reviewing study programmes and textbooks
- B. scientific contribution criteria: reports at scientific and professional conferences, keynote, and plenary lectures, leading and participating in scientific projects, reviewing

- scientific papers and projects, publishing scientific and professional papers, membership in programme and organisational committees of conferences
- C. institutional contribution criteria – performance of leading and managerial duties, development, and implementation of lifelong learning programmes as well as knowledge and technology transfer programmes, membership in editorial boards of scientific and professional journals, awards and recognitions.

Favourable results of student surveys are also a necessary requirement for the election to the academic rank of assistant professor as well as the favourable evaluation of the inaugural lecture held in accordance with the [Ordinance on the form and manner of conducting the inaugural lecture of the Rector's Assembly](#).

[Favourable reports of the Expert Commission](#) (page 22 – 37), accompanied by all necessary documentation and evidence on meeting the requirements, are submitted to the University of Zagreb for approval. The final approval of the candidates elected to the academic ranks of assistant professor and associate professor is given by the area council of the University, and the final approval of the candidates elected to the academic ranks of full professor and tenured full professor by the Senate of the University of Zagreb.

Due to comparatively low national criteria, the Faculty adopted additional requirements for elections in 2009 in the form of recommendations which still apply today ([Recommendations for Election to Academic, Teaching, and Associate Ranks](#)). Usually, teachers significantly exceed the national and even stricter Faculty requirements prescribed for elections to ranks so earlier elections to ranks are conducted occasionally, but only after the expiry of the prescribed three-year term in accordance with the [Act on Scientific Activity and Higher Education](#) (article 32).

In order to ensure the excellence of new assistant professors, the [Scoring System for the Applicants Eligible for the Academic Rank of Assistant Professor](#) is applied in the employment process. Scoring can be carried out provided that the applicant meets the requirements of the Rector's Assembly, requirements of the National Council for Science and the general requirements of the Recommendations for Election to Academic, Teaching, and Associate Ranks of the Faculty of Chemical Engineering and Technology. In the election procedure for the academic rank of assistant professor, the Expert Commission prepares a ranking list of applicants where each applicant is scored for his/her contribution to scientific, teaching, and professional activities (maximum 50 points), inaugural lecture and scientific and professional competencies (maximum 35 points) and presentation of previous work as well as proposal of future research activities in addition to the interview with the applicant (maximum 15 points). [An example](#) of the application of the scoring system for the election of a new assistant professor can be viewed from the materials of the 208th session of the Faculty council (pages 18 – 113).

IV.3 Higher education institution provides support to teachers in their professional development

The higher education institution provides opportunities for improvement of teachers' competencies at faculty or university level.

The higher education institution encourages evaluation and improvement of teaching competencies based on recommendations obtained from assessment of fellow teachers in the teaching process and based on results of student evaluation of teachers' work.

The teachers participate in international mobility programmes, collaborative projects, networks, etc.

The Faculty of Chemical Engineering and Technology provides significant support and offers various opportunities for improvement of teachers' competencies in their scientific, teaching, professional and institutional activities. Scientific activities include administrative and accounting support for research projects (Table 5.3 of the Analytical Supplement) but also the use of laboratories and other necessary facilities, including research equipment and infrastructure. When necessary, the facilities are adapted and modernized according to project requirements. For research projects of the Croatian Science Foundation, the costs of maintaining the research laboratory infrastructure, safety-at-work certification and of the removal and disposal of waste chemicals are fully borne by the Faculty. Computers for teachers, project researchers and all other personnel are also procured with the Faculty's own funds. The applications of young researchers (assistant professors) for installation projects of the Croatian Science Foundation in the last two tenders (2020/2021) were additionally funded [in the amount of 150,000 kuna per project application](#) for the purchase of research equipment. The funds have been allocated from the Faculty's Fund for Promotion of Activities. Based on exceptional requests made by teachers, we have funded the purchase of new research equipment [in the amount of 2,000,000 kuna](#) (AFM; device for separation and analysis of organic compounds in the Laboratory for Thin Inorganic Layers). Most of these funds will be returned through [research projects](#).

The [Call for Modernization of Student Laboratories](#) was carried out for the purpose of improving the teaching process. Based on [their applications](#) it provides the teachers with [funding](#) for introduction of new laboratory exercises. Roughly, [640,000 kuna](#) of the necessary 3,000,000 kuna have been invested in new equipment. The programme has been suspended due to high costs of repair of damage caused by the earthquake, but it is expected to continue very soon, in line with the revision of study programmes and course contents. Furthermore, [publishing of university textbooks](#) is also funded, however with a relatively modest amount of 10,000 kuna, which allows for a partial coverage of costs.

Workshops are also held on a regular basis to improve the competences of the [teaching](#) and [non-teaching staff](#), very often as part of projects or due to the need to digitalize the business processes (e-accounting, e-student registry office, safety-at-work). In professional activities, the Faculty encourages projects involving direct cooperation with business and other subjects by allocating a very small percentage, only 10% of the agreed amount for development funds of the Faculty.

According to specific competences of individual employees, the Faculty encourages their appointment to and participation in various university and other committees, as well as in professional, scientific, domestic, and international associations, or wherever possible, they are appointed directly to them as representatives of the Faculty. Annual membership in the basic professional association by scientific area and field in which the teacher works is covered by the university. In academic year 2020/2021, in cooperation with the [Croatian Society of Chemical Engineers](#) (HDKI, founded in 1912), the Faculty has launched a joint

[lifelong learning programme](#) with specialist workshops, which provide organisational and marketing support to teachers.

An [in-house Innovation Competition](#) was held in 2019 in cooperation with the Zagreb Inventors' Association enabling teachers to participate at international innovation fairs with their own innovations resulting from their research and professional work ([example 1](#), [example 2](#)). In line with the development strategy, vision and policies of the Faculty that encourage cooperation with the economic sector on projects for the development of new, innovative chemical processes, products, materials and projects in the environment protection field and improvement of the existing ones, the competition continued in the coming years. However, due to pandemic circumstances and failure to hold fairs, the activities have been reduced in the academic year 2020/2021. The result of these activities is a [large number of gold and other medals and special awards won at innovation fairs](#) in [2019](#) and [2020](#). The Faculty has been developing a comprehensive system of protection of rights and commercialization of innovations, which is its strategic goal promoting innovation and technology transfer, all in line with the measures of the Republic of Croatia proposing and fostering the development of the national innovation system and promoting technological development. The Faculty is acquainted with the decision of the European Investment Fund (EIF), the Croatian Bank for Reconstruction and Development (HBOR) and the Slovenian Export Development Bank (SID) to launch a regional Technology Transfer Fund. The Fund's minimum resources will amount to 40 million €, and will be used to finance research projects, technological development, and intellectual property with potentially high commercial value for the economy. Thanks to the recognizable activities in this area, the Faculty was asked by the Croatian Pension Investment Company (HMID) [to support in writing](#) its application for the governing body of the Fund.

In addition, there is a constant, open [invitation for financial and other support](#) for teachers, other employees, and students to open start-up companies. Applications based on business plans are evaluated by members of the commission consisting of the Dean, President of the Board of the Faculty's spin-off company CWT, Vice-Rector for innovation and development of the University, director of the Zagreb Innovation Centre – ZICER and Nenad Bakić, a prominent entrepreneur and one of the leading Croatian investors, majority of the commission being external members. On 27 November 2020, the project ReCorrQCQ by prof. Sanja Martinez and associates was awarded a ZICER [award of 160,000 kuna](#) within the framework of the Start-up Factory Programme of the Zagreb Innovation Centre.

Teachers' performance is evaluated every year by students filling out the Teacher Performance Assessment Survey, then by the Teaching Committee and by the teachers themselves in a [self-assessment procedure](#). In the course of the academic year 2019/2020, a review of all study programmes was initiated which was suspended on the account of the earthquake and pandemic circumstances. It is planned to continue in 2022. During the review, we have also gathered opinions and evaluations of students on their teachers, study programmes, compliance of the student load with ECTS credits and opinions of businessmen on their satisfaction with competencies of graduates. Therefore, we have introduced an [Award for the best e-course](#) in the academic year 2018/2019, which includes a plaque and a cash reward. Following the proclamation of the coronavirus pandemic, a lot of money was invested in IT and multimedia equipment for distance learning, hybrid teaching and for making audio and visual recordings. At the same time, the Faculty has conducted in-house teacher training workshops to train teachers in the use of IT tools and software and teachers were provided training at the Centre for e-learning of the University Computing Centre (SRCE). The development strategy also emphasizes the adoption and application of new methods in university teaching, which will be accompanied by the necessary

investments. In developing and improving competences, the so-called soft skills have not been ignored, so during the 2020/2021 academic year, the following [workshops](#) were held:

- Modern teaching methods – psychological basis (30 November 2020)
- Modern teaching methods – learning, memory, and knowledge system development (December 1, 2020)
- Setting and defining goals (learning outcomes) – a case study (December 7, 2020)
- Communication skills 1 – theoretical basis (December 9, 2020)
- Communication skills 2 – supervision (December 14, 2020)
- Behavioural framework analysis: managerial vs. mentoring approach (behaviour vs. opinions) (December 15, 2020)
- Entrepreneurship (December 21, 2020)
- Project management (December 23, 2020)
- Student motivation techniques – basics (January 21, 2021)
- Student motivation techniques – application to learning outcomes (January 27, 2021)
- Practical application analysis – supervision (January 28, 2021)
- Practical application analysis – supervision 2 (February 3, 2021.)

Conditions for acquiring rights, obligations and the manner of using the free study year for teachers are determined by the [Ordinance on the use of the free study year](#) of the Faculty (January 30, 2014, and [amendments](#) on July 15, 2020). It is used relatively infrequently; last time from prof. PhD for a one-year stay at ICCAS – Chinese Academy of Science, Institute of Chemistry (Beijing, China) (academic year 2015/2016).

Teachers regularly participate in international mobility programmes such as those under ERASMUS+ or CEEPUS or go abroad to work on collaborative projects (Table 4.5. of the Analytical Supplement). It should be emphasized that in academic year 2020/2021, the pandemic circumstances have had an extremely negative impact on this area. Activities that have not been delayed, mostly take place remotely.

Teachers are involved in a number of [COST networks](#) (European Cooperation in Science and Technology) for cooperation in scientific and technological research.

Teachers also participate in the project [Tackling Hazardous Substances Pollution in the Danube River Basin by Measuring, Modelling-based Management and Capacity building programme \(DTP3-1-299-2.1 – Danube Hazard m3c\)](#) within the Interreg Danube Transitional Programme. The Project enables close collaboration with scientists and experts from the Danube region. The project leader is Technical University of Vienna, Institute for Water Quality and Resource Management. A series of online meetings and one expert visit were held in September 2021, which is a big step in solving project activities and which includes networking with colleagues from the region and devising ideas for new collaborative projects. The Faculty participates, as a partner, in the international project [Strengthening university autonomy and increasing accountability and transparency of Western Balkans Universities \(STAND\)](#) as part of the Erasmus+ programme. The applicant is the International Business College Mitrovica from Kosovo. A workshop was held as part of the project in July 2021 during which the Faculty teachers had the opportunity to strengthen the network with their colleagues from several neighbouring countries. As mentioned earlier, the collaboration in teaching for students from the institution of higher learning ITECH Lyon has continued for the fourth year in the row. In the academic year 2020/2021, 37 French students stayed at the Faculty and all related activities have been coordinated by Prof. Marko Rogošić.

Faculty teachers have offered courses in the English language which are held online in the winter semester within the framework of the [European University of Post-Industrial Cities – UNIC](#). In addition, the teachers offer courses in the English language for the incoming students under the ERASMUS+ programme.

In cooperation with the Croatian Society of Chemical Engineers (HDKI), the Faculty teachers participate in the following scientific and professional associations:

- [European Federation of Chemical Engineering](#) (EFCE), Vesna Tomašić, representative of the HDKI and member of the General Assembly
- EFCE Work Group on Thermodynamics and Transport Properties, Marko Rogošić, Croatian delegate
- EFCE Work Group on Fluid Separations, Igor Dejanović, Croatian delegate
- [European Polymer Federation](#), Ante Jukić, Croatian delegate
- [European Society of Applied Biocatalysis](#) – ESAB, Zvezdana Findrik Blažević, Croatian delegate and member of the working group Standardization in Biocatalysis
- [Central European Group for Separation Sciences](#), Tomislav Bolanča, member of the Management Board
- [Division of Environmental Chemistry \(ENVR\) of the American Chemical Society](#) (ACS), Hrvoje Kušić

The Faculty's Development Strategy stresses that mobility and international cooperation should be significantly improved in the upcoming period, as they are of strategic importance, particularly in the framework of research projects and cooperation and bearing in mind the negative impacts of the pandemic that will have to be overcome.

IV.4 Premises, equipment, and the overall infrastructure (laboratories, IT service, work sites) are adequate for the implementation of study programmes and ensure the achievement of envisaged learning outcomes and the implementation of scientific/artistic and professional activities

The institution of higher education plans and improves infrastructural development in line with its strategic objectives.

The premises, equipment, and the overall infrastructure (laboratories, IT services, work sites, etc.) are adequate for the implementation of study programmes and ensure that the achievement of envisaged learning outcomes.

The premises, equipment, and the overall infrastructure (laboratories, IT services, work sites, etc.) are adequate for the implementation of scientific/artistic and professional activities.

The spatial resources of the Faculty have not been satisfactory for decades. The Faculty has premises in four buildings located at Marulićev trg 19 and 20 and at Savska cesta 16 and 16/5A. None of these buildings is owned by the Faculty nor is the Faculty their sole user. The building at Marulićev trg 19, which houses the Dean's Office and joint services, and which therefore represents the official address of the Faculty, is shared with the Geography Department of the Faculty of Science (PMF), University of Zagreb, and the Ivo Pilar Institute of Social Sciences. The Faculty shares the building at Marulićev trg 20 with the Department of Botany, Faculty of Science, and the Department of Pharmacognosy, Faculty of Pharmacy and Biochemistry, University of Zagreb, while the building at Savska cesta 16 houses private tenants too. Although the buildings are relatively close to each other, the consequences of this separation are felt in the teaching, scientific and professional activities of the Faculty. Obsolescence and poor maintenance on the part of the owners (Ministry of Science and

Education, Faculty of Science, Nikola Tesla Technical Museum) due to insufficient funds for material maintenance allocated by the Ministry of Science pose greater difficulties. With the exception of the smallest building at Savska cesta 16/5A, all other buildings were built in the first half of the 20th century. Almost a third of the available premises is located in basements and attics. All in all, it is clear that all working premises are inappropriate for the current needs of the Faculty, and in particular for modern scientific research activities.

As the final solution to the bad current situation, the plan is to move the Faculty to the location of the Borongaj Campus in accordance with the Spatial and Functional Development Strategy of the University of Zagreb adopted on July 8, 2014 as well as the project programme proposal for the building of the Faculty at the Borongaj Campus adopted on March 24, 2014 at the meeting of the Faculty Council. Despite the initial momentum and intentions, there have been no visible developments so far. The Faculty's Development Strategy 2015 – 2020 states that everything the Faculty was able to do on its own so far regarding the relocation to the Borongaj Campus has already been done. As there were no indications from the University that anything could change in the near future, the Faculty has focused its activities on other possible solutions. Accordingly, it has invested its own funds in the improvement and modernization of the existing spatial and infrastructural resources to ensure the best possible conditions for teaching and research work that Faculty's students and teachers deserve. In addition, [plans and preliminary design](#) have been made for the expansion of the spatial resources of the Faculty at Savska cesta 16 in the courtyard area where the existing single-storey building of the Faculty of Civil Engineering would be pulled down and a new building built for the needs of the Faculty of Chemical Engineering and Technology. The pulling down of the building housing the hydrotechnical laboratory of the Faculty of Civil Engineering and the construction of a bigger new building would satisfy the needs of the Faculty of Civil Engineering as well. The estimated costs of construction amount to € 22 million (7000 m²) and the costs of equipment, including research equipment, € 14 million. At the same time, the Faculty has initiated the procedure for resolution of property and legal relations with the City of Zagreb and the city-owned institution – the Nikola Tesla Technical Museum.

Table IV.1. gives an overview of spatial resources for teaching, per building.

Table IV.1. Spatial resources of the Faculty of Chemical Engineering and Technology and their primary purpose

Building address	Year of construction	Premises with the primarily teaching purpose	Premises with the primarily research purpose	Library
Trg Marka Marulića 19	1937	2451 m ²	615 m ²	
Trg Marka Marulića 20	1914	4442 m ²	1417 m ²	204 m ²
Savska cesta 16	1916	2803 m ²	572 m ²	
Savska cesta 16/5A (courtyard)	1950	197 m ²	91 m ²	

Classes are held in lecture halls, laboratories and computer classroom (Table 4.8 of the Analytical Supplement). The lecture halls are equipped with modern audio-visual equipment and equipment for hybrid and distance learning. The big lecture hall at Marulićev trg 19 and the IT classroom are fully equipped with computers (60 + 24) and the

necessary software (MathLab, ChemCad, Mathematica, Aspen...). The laboratory equipment is in accordance with the needs of the laboratory exercises. With a number of minor interventions, the [students' administration office](#), [student laboratory of the Department of Mechanical and Thermal Process Engineering](#), [mixed student and research laboratories of the Department of Organic Chemical Technology and Polymer Engineering](#) as well as two lecture halls at Savska cesta 16 which can house 80 ([lecture hall S1](#)) and 40 ([lecture hall S0](#)) students respectively, have been fully renovated since 2017.

Worn-out laboratory furniture has been replaced and new fume hoods installed as part of the renovation process. The total value of these projects was 2.5 million kuna. As mentioned earlier, an invitation to tender was published for modernization of student laboratories, in which an additional one million kuna was invested. The Centre for Student Counselling and Career Development (ESF, 3.7 million kuna) and laboratories with modern equipment for renewable energy, nanotechnology and advanced process engineering for Industry 4.0 have been established as part of the CeSaR project. These include the Atomic Force Microscope (AFM), devices for Electrochemical Impedance Spectroscopy (EIS), device for measuring the size of particles based on dynamic light scattering (nanoDLS) as well as software and hardware support: LabView of the company National Instruments for design of own programmes, simulation and collection of experimental data, Simcet & Pitops of the company PiControl for modelling, simulation and optimization of industrial process control systems, SIPAT of the company Siemens – process analytical technology for optimization and advanced process control. About 200.000 kuna has been invested in IT equipment for distance learning and live video broadcasts over the online channel of the Faculty. The total amount of capital equipment at the Faculty obtained in the period from 2016 to September 2021 is around 7,000,000 kuna (Table 4.9, Analytical Supplement)

Bearing in mind all the above and knowing that classes are held from 8.00 am to 5.00 pm, it can be concluded that spatial resources, equipment, and infrastructure enable teaching in an adequate manner, but that it is necessary to continue to look for opportunities for improvement and development.

Table IV.1. gives an overview of spatial resources for research activities per building, while Table 4.8. of the Analytical Supplement gives an overview according to purpose. Considering the needs of a large number of scientific and research projects currently underway as well as the needs for office space for project researchers, the situation is not satisfactory. As this activity is unevenly distributed among departments and research groups, the distribution of needs is optimized at the level of department groups (e.g. Department of Oil Technology and Petrochemistry, Department of Polymer Engineering and Organic Chemical Technology, Department of Surface Engineering of Polymer Materials). Within the framework of certain projects, high-value capital research equipment has been procured or is being procured ([a total of around 20 million kuna](#)), which is why the premises for accommodating this equipment have been or are being furnished (e.g. a new basement laboratory and renovation of the existing ones at the Department of Inorganic Chemical Technology, Department of Polymer Engineering and Organic Chemical Technology, Department of Measurements and Process Control). New department laboratories for research and professional activities have been established: LAM laboratory at the Department of Measurements and Process Control and ReCorr laboratory at the Department of Electrochemistry. While spatial and infrastructural constraints are currently managed in the manner that they do not adversely affect the quality performance of research and professional activities, the Faculty will need to make greater efforts taking into consideration that a higher number of projects is expected from EU cohesion and structural funds. Only a significant spatial expansion in accordance with the presented plan would

enable optimal operation and development of leading groups in research and professional activities.

The earthquake magnitude 5.5 on the Richter scale that hit Zagreb and its surroundings on Sunday, 22 March 2020, at 6:24 am caused significant damage to the buildings at Marulićev trg 19, Marulićev trg 20 and Savska cesta 16 used by the Faculty. Therefore, immediately after the earthquake, Faculty's Management banned the employees from coming to work until the buildings were approved as structurally safe. Due to the epidemiological situation caused by the coronavirus, all classes were already held at a distance, so students did not come to the buildings. The condition of the buildings was reported to the relevant authorities of the City of Zagreb, Ministry of Science and Education and of the University. Already on Tuesday evening, structural engineers visited all buildings and assigned marks – green for the building at Marulićev trg 20 (Rapid inspection conducted – usable without restrictions; chimneys need repair) and yellow marks for the other two buildings (Temporarily unusable). All damage was [photo-documented](#), and further detailed inspections were carried out. In order to enable the buildings for teaching and other activities, emergency repair measures were taken according to the detailed findings of structural engineers – in addition to a series of minor interventions on all buildings, large boiler chimneys were taken down on both buildings at Marulićev trg which were cracked and threatened to cave in, as well as over 50 broken and damaged smaller roof chimneys. A number of skylights was replaced; the vault over the main entrance and a section of the broken wall in the attic of the building at Savska cesta, which threatened to cave in on the main entrance to the building and on the street, was reinforced. In addition, damaged walls and ceiling plaster were repaired in many places. The Government of the Republic of Croatia allowed the students to return to lecture halls on 11 May and since then, as the first at the entire University of Zagreb, the Faculty began holding lectures and laboratory exercises, as witnessed by the Croatian Radiotelevision camera crew. At that moment, all premises used by the Faculty were fully usable and safe, without restrictions. New boiler chimneys were built by September. In addition to earlier making of all gas installations operational and obtaining all necessary permits, this enabled heating and regular operation of all the buildings of the Faculty. The repair works required temporary displacement of some departments and offices of the Faculty, which was organised and carried out without any major difficulties. About 2.6 million kuna of Faculty's own funds were spent on necessary repairs. A law was enacted setting forth the necessity to carry out a complete and anti-earthquake rehabilitation of damaged old public buildings, which includes all the main buildings used by the Faculty. Reconstruction projects financed by EU Solidarity Funds are underway starting with the preparation of project documentation. So far, the reconstruction projects have not had a significant impact on teaching, research, and professional activities.

IV.5 Library and its facilities, as well as access to additional contents, ensure the availability of literature and library services for the needs of quality study and quality research-teaching / artistic-teaching activities

Library and its facilities, as well as access to additional contents, ensure the requirements for a quality study.

Library and its facilities, as well as access to additional contents, ensure the requirements for quality research-teaching / artistic-teaching activities

[The Library and Information Centre](#) (BIC – *Bibliotečno-informacijski centar*) of the Faculty was founded in 1984. Its library fund covers the areas of chemical engineering, chemistry, thermodynamics, physics, mathematics, and environmental science (Table 4.10

of the Analytical Supplement). The BIC is open for all users from 8 am to 4 pm every weekday.

The library is located in the building at Marulićev trg 20. It consists of the main section of 102 m² surface area where textbooks, reference literature and journals have been stored since 1974. Current periodicals are shelved separately. The main section houses a reading room with 14 seats, also used as a study room, and two offices. The storage section (55 m² of which are on the third floor and 39 m² in the basement) houses the entire fund of journals older than 1974, books and masters' theses (1102) which, together with dossiers, were moved from the main Archives of the Faculty at Marulićev trg 19 in the beginning of 2019. The location of the library is inadequate due to a lack of favourable microclimate conditions required for storing library materials. The main room on the third floor is situated in close proximity to the laboratory fume hood exhausts, making the ventilation options limited. In addition, the noise coming from the laboratory fume hood fans interferes with the work of the staff and the students. The basement rooms lack sufficient windows, heating and are humid. The same applies to the conditions for keeping degree theses in the Faculty Archives.

Apart from materials for general needs (library fund, borrowing of materials to students), the BIC also procures books for Faculty staff which it then processes and forwards to the client. Due to the lack of space, most books from specialized fields are located at departments' premises. However, all the journals are kept exclusively on the library premises. The BIC itself stores 3620 books. Undergraduate theses, graduate theses and doctoral dissertations are catalogued and stored separately (7676) in the Faculty Archives. Borrowing qualification papers is possible only from the library. The overall Faculty library fund today consists of over 200.000 volumes, including books, journals, and degree theses.

The BIC provides bibliometric services – issues certificates of indexing and citing of papers for the needs of promotion of candidates to research and academic ranks. In addition to analysis of scientific productivity provided at the request of individuals, it collects and processes bibliometric data for the needs of the Faculty, such as procedures of re-accreditation, application and follow-up of scientific projects, awards, statistical reports, and the like.

The library fund is increased by subscriptions to bibliographic and citation databases and electronic journals of major foreign publishers, access to which is ensured under a national license or the University license via the [Electronic Resources Portal](#) for the Croatian academic and scientific community established as part of the Increasing Access to Electronic Resources of Scientific and Professional Information Project, the holder of which is the National and University Library in Zagreb.

In terms of equipment, the BIC has three desk computers and one laptop, three printers, one of which for students, a colour photocopier, a scanner, a thermal binding machine, a barcode reader and printer and a magnetic card reader.

On average, 70 books (titles) are procured annually, whereas the number of purchased printed journals has decreased dramatically in the last couple of years – in the academic year 2019/2020 only three titles were purchased. The main reason for this is the availability of the vast majority of important journals online.

The library computer programme [Aleph](#) was introduced in 2010. It is an integrated library system of the National and University Library in Zagreb and of the libraries of higher education institutions and scientific libraries. Through its online catalogue, the library provides access to data belonging not only to its own fund but enables integrated search of

over 40 library catalogues of the integrated library system. This system is of the greatest importance as it represents the first step in creating a national library system by consolidating data on funds of all involved libraries.

The BIC receives an average of 150 user requests annually, most of which relate to the procurement of scientific and professional articles. In addition, the BIC performs thematic literature search upon receipt of the filled-out Request. Interlibrary exchange also includes the exchange of own editions, as well as of journals, collections or duplicates of library materials which enrich the library fund. In order to facilitate the process of ordering materials through interlibrary loan, the Scientific Information Centre of the Ruđer Bošković Institute has developed the [SEND](#) – electronic document procurement system, an application through which libraries can order materials from all other libraries logged into the system.

In 2015, Srce (University Computing Centre) established the Faculty Repository in the [Dabar](#) system (Digital Academic Archives and Repositories). Dabar is a joint project of Croatian higher education and scientific libraries and Srce. As a digital collection, the repository brings together in one place papers authored by faculty teachers and students for the purpose of long-term storage, search, and open access. Currently, the repository stores undergraduate and graduate theses, with the possibility of storing doctoral dissertations whereby full control of the right of access and use of data is made possible.

IV.6 The higher education institution rationally manages financial resources

Financial sustainability and efficiency are visible in all aspects of the higher education institution's operation.

The higher education institution manages financial resources transparently, efficiently, and purposefully.

Additional sources of funding are used for the development and improvement of the higher education institution.

Additional sources of funding are provided through domestic and international projects, cooperation with the industry, local community, etc.

Financial sustainability and efficiency are ensured by timely planning, reporting on the execution of financial plans and rational management without taking significant financial risks. [The financial plan](#) is prepared at the end of the calendar year for each subsequent year with a projection of up to three years. The plan is discussed and adopted by the Faculty Council and then the faculty plans are consolidated at the University level and adopted at the Senate sessions. Financial statements are submitted on a quarterly basis and semi-annual and annual financial statements are discussed at the sessions of the Faculty Council whereby the adopted annual financial statements are made available to the public and the employees by posting them on the [Faculty's website](#). Based on the financial plan, the [Procurement Plan](#) is prepared which, depending on the procurement type and amount, has a different procedure – from simple to public procurement – all in accordance with its own procurement regulations and statutory provisions. Accounting activities have been fully digitalized, which also applies on travel orders and scientific and professional projects, each of which has its own ledger account. All business processes are prescribed and consolidated on the Faculty website. The main [Business Processes Map](#) includes the following maps: Planning and management of financial resources, Accounting, Salary accounting and payment, Public procurement, Human resources management, Cooperation with economic subjects and organisation of seminars and conferences, Faculty souvenir shop / bookshop. The most recent national audit of business processes was conducted in 2020.

The analysis of financial statements from 2016 to 2020 shows a steady growth of both income and expenses. The 2020 fiscal year shows an increase in expenses by 20% compared to 2019, which is the result of intensified research projects' activities, the continuation of development investments and the costs of earthquake damage repairs. The deficit was partly covered by profit brought forward from 2019, while the rest of the deficit was covered from allocated income following the requests for reimbursement for structural IRI projects (IRI projects are financed by Faculty's own funds, and afterwards the Request for reimbursement is filed every three months). Figures IV.2 and IV.3 show a growth trend in income and expenses in the observed period, i.e. the changes of the respective financial result.

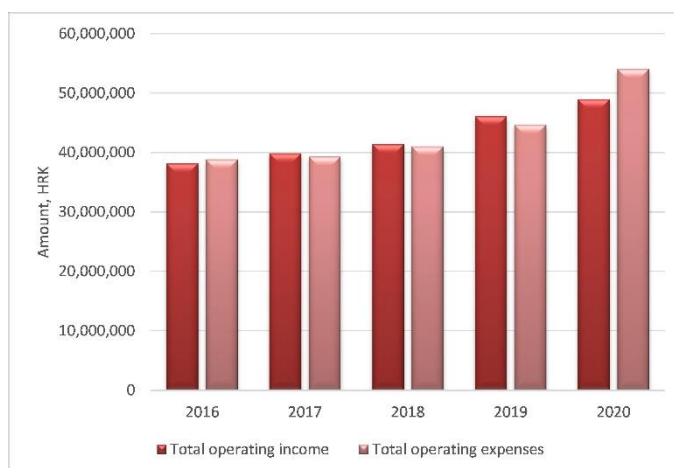


Figure IV.2. Changes in operating income and expenses in the period from 2016 until 2020

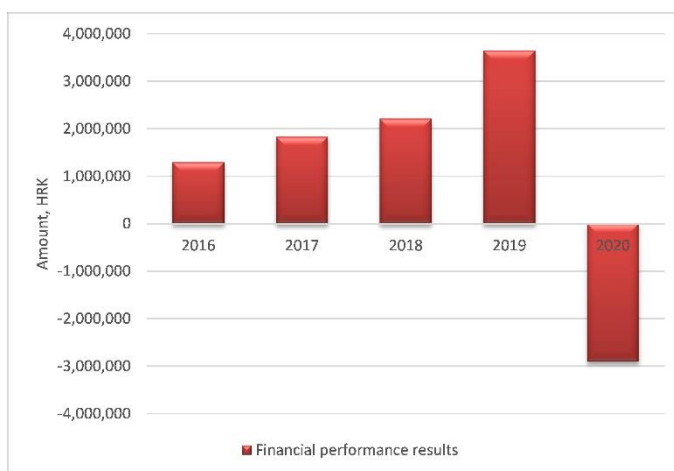


Figure IV.3. Changes in financial performance results in the period from 2016 until 2019

The academic year 2020/2021 was extremely dynamic due to the extraordinary circumstances of the pandemic, severe earthquake, and the earthquake damage repair works. The Faculty has entered into contracts with the Ministry of Science and Education worth 76,055,184.26 kuna provided by the EU Solidarity Fund for the purpose of carrying out the comprehensive renovation of the building at Trg Marka Marulića 19 and the first part of the funds was obtained for emergency rehabilitation of earthquake damage for the building at Marulićev trg 20. The funds are drawn based on the Request for Advance Payment and the Request for Reimbursement of funds that are being prepared.

In the period from 2016 to 2020, the Faculty recorded a revenue growth generated by European projects and the arrival of funds for new projects funded under the Efficient

Human Resources Operational Programme and the Competitiveness and Cohesion Programme. In terms of value and share, the largest share refers to projects under the Competitiveness and Cohesion Programme and European projects – Nowelties, Interreg, Carbazymes, CC-TOP, RadicalZ. The revenues from these projects are shown in Figure IV.4.

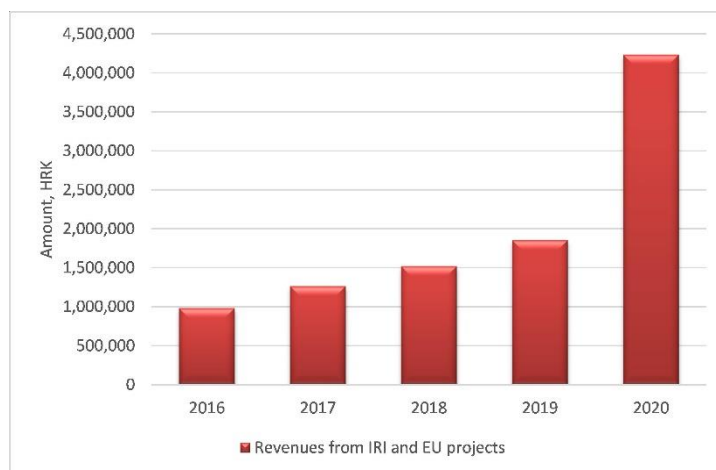


Figure IV.4 Revenues from IRI and EU projects throughout fiscal years

The revenues to which special regulations apply and the revenues of the Croatian Science Foundation are also higher when compared to the preceding period, see Figure IV.5. In the academic year 2020/2021, 6,720,684 kuna were paid in, which shows a strong growth of research activities.

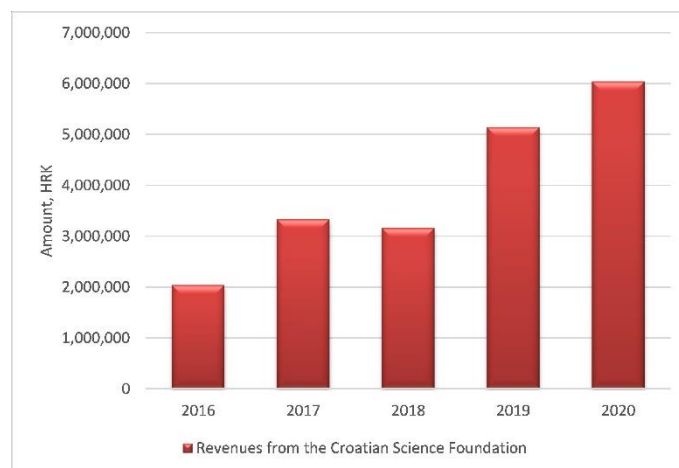


Figure IV.5 Revenues from the Croatian Science Foundation

In the fiscal year 2020, the laboratory equipment worth 6,509,607 kuna was purchased while the investments in the course of the academic year 2020/2021 amounted to 4,811,436.00 kuna, which was mostly provided and planned under IRI and European projects. The procurement of research equipment shall continue in the academic year 2021/2022 as planned and in the public procurement procedures (two public procurement procedures worth 11 million kuna are underway). Although the amounts are high, the Faculty does not expect financial liquidity difficulties caused by higher financial turnover due to a large number of projects of significant overall value. At the same time, old computers

are replaced by new ones on a regular basis and the software licenses paid, mostly from the Faculty's own income. The funds spent on equipment are shown in Figure IV.6.

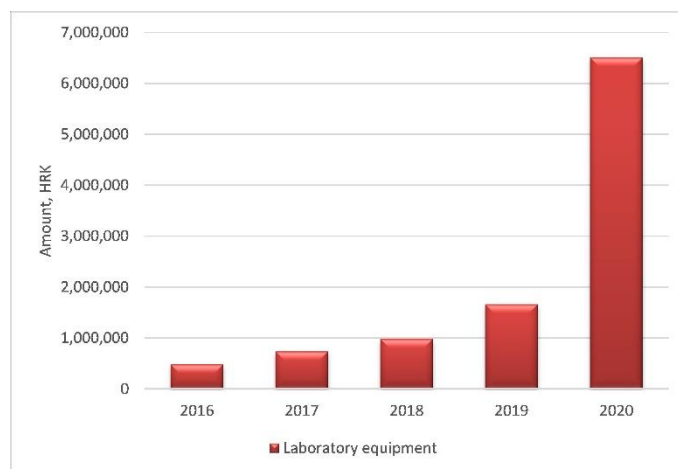


Figure IV.6 Value of purchased laboratory equipment

The expenses for current and investment maintenance of buildings have significantly increased due to earthquake rehabilitation, see Figure IV.7.

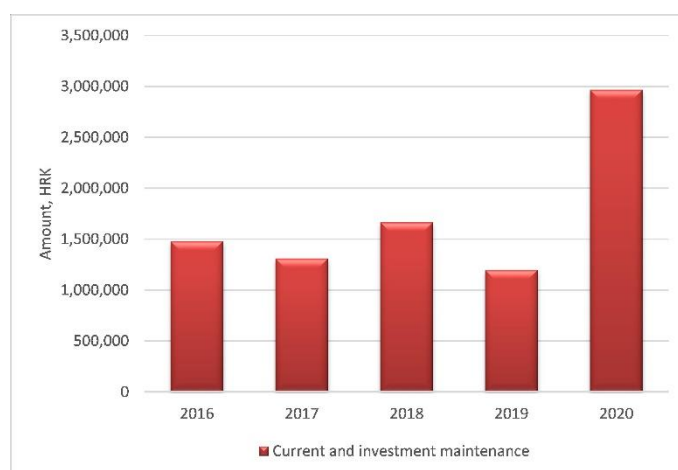


Figure IV.7 Expenses for current and investment maintenance

Rational fund management together with good organisation of assigned activities have been extremely important for the results achieved, which has directly contributed to achieving the set goals in difficult business circumstances. The revenues from EU funds have also recorded a growth trend and are a very important item at the institution level. The Faculty has been increasingly turning to generating revenues outside the general government and the Faculty has been recognized as a reliable business partner either in the role of the project holder or the project partner.

V Scientific / artistic activity

V.1 Teachers and associates employed at the institution of higher education are committed to achieving high quality and quantity of scientific research

Teachers and associates publish an adequate number of quality scientific publications.

The institution of higher education has in place effective procedures for encouraging quality scientific publishing.

The institution of higher education records data on publications (indexing, citations, h-index, if applicable).

Scientific/artistic activity of the institution of higher education is visible in doctoral dissertations.

Teachers and associates working at the institution of higher education actively promote scientific / artistic achievements at conferences, in the country and abroad.

In the period from 2016 to 2021, the employees of the Faculty in academic ranks, together with the employees in associate ranks (doctoral students and postdoctoral scholars) published 550 research papers in journals indexed in the WoSCC database (Web of Science Core Collection, A category) which is 8.46 papers per employee in the academic rank (1.69 per year) and 13 papers in journals indexed in the Scopus database, in addition to those already indexed in the WoSCC database, which is 0.20 papers per employee in the academic rank (0.04 per year) (see the Table 5.1 of the Analytical Supplement). If one observes the annual trend, the number of papers increased in the period from 2015 to 2019, which was followed by a slight decline (Figure V.1.A) attributable to the consequences of decreased funding and less cooperation with external institutions due to the coronavirus pandemic.

The current total citation count of publications is 37149 in the Web of Science Core Collection database and 39227 in the Scopus database. The overall h-index of the institution of higher education is 81 in the Web of Science Core Collection database and 85 in the Scopus database.

The publication of papers is largely based on the requirements of scientific projects funded by the Croatian Science Foundation and under the Horizon 2020 Programme which encourage publication in journals with an impact factor within quartile 1 (Q1) and quartile 2 (Q2). Accordingly, the number of papers published in journals of quartile 1 (Q1) and 2 (Q2) is significantly larger than in journals of quartile 3 (Q3) and quartile 4 (Q4), classified according to the Journal Citation Reports database (JCR) (Figure V1.B.). This is an indication of excellence of scientific research of employees in the academic rank. Accordingly, this raises the overall scientific excellence and international recognition of the Faculty itself.

In addition, the Faculty Council introduced the Ivan Plotnikov Award in 2015, which is awarded every year to most productive young scientist of the Faculty. The criteria for the award is the total number of published papers during the calendar year and the impact factor of the journal weighted by the number of co-authors, in accordance with the Ordinance on the Requirements for the Election to Research Ranks in the field of engineering. Furthermore, the Faculty is currently considering creating internal criteria for early promotion of employees to academic ranks after the expiry of the three-year period from the previous election in accordance with the Act on Science and Higher Education. The criteria would evaluate scientific excellence based on quantity and quality of scientific work, i.e. the number of papers in journals, impact factor and the journal ranking quartile as well as the number of scientific projects in which the candidate participates as project leader and partner. The criteria would also evaluate international recognition through standard scientometric indicators (citations, h-index), number of keynote lectures, number of

participations in international editorial boards, number of peer-reviewed papers in foreign journals, membership in programme committees of international conferences and functions in international scientific organisations. These evaluation elements would become an integral part of the so-called table of achievements to be considered by the Strategy Commission in the event of eventual early promotion.

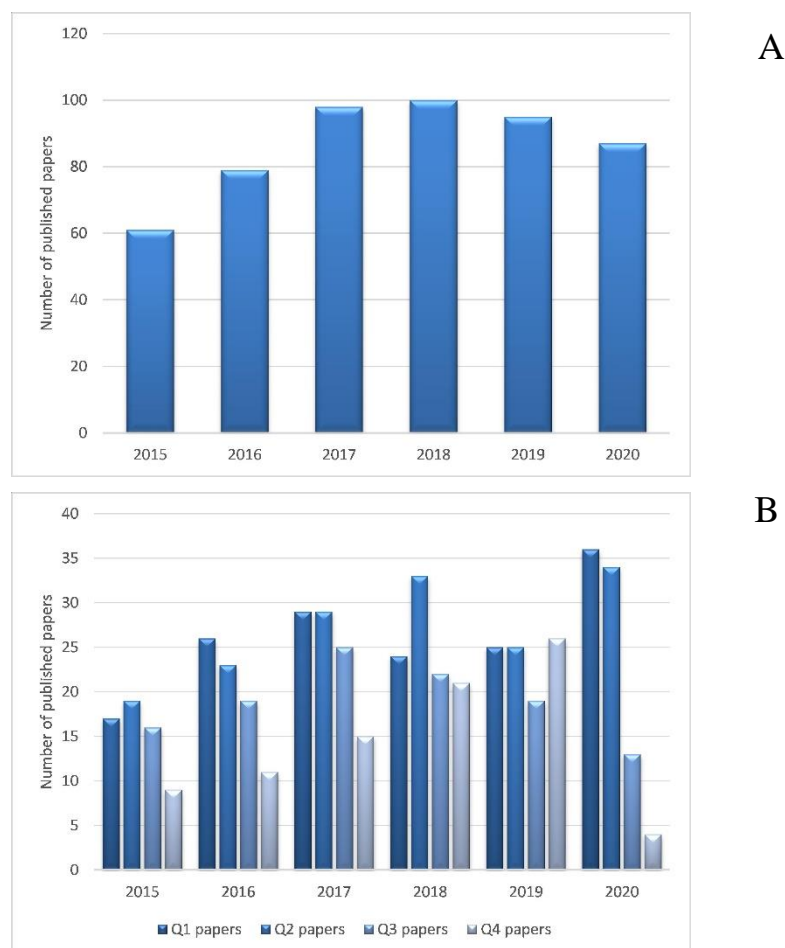


Figure V.1 Number of published research papers in journals in the period 2015 – 2020; in total (A) and classified per quartiles of the Journal Citation Reports database (B).

The Faculty regularly nominates its successful scientists for prestigious state awards such as the State Science Award, awards granted by the Croatian Academy of Sciences and Arts (HAZU) and the Croatian Academy of Engineering (HATZ), Fran Bošnjaković and Andrija Mohorovičić Iniversity of Zagreb awards, etc.

The employees in academic ranks are obliged to store scientific, professional, and popular papers in the Croatian Scientific Bibliography – CROSBI database, and [every employee](#) has her/his profile on the Faculty’s website with a direct link to that database. These data, in addition to those published in the Web of Science Core Collection and Scopus databases, are the basis for monitoring the quality and quantity of scientific and professional work. The analysis of scientific productivity of the Faculty is one of the items present in the [regular Dean’s annual reports](#) and the [Annual Self-analyses](#) of the Faculty. The analysis covers data on the number and type of projects, number of research papers published in journals, participation of scientists at international conferences, etc.

The Dean has rendered a decision conditioning the application for obtaining university support for scientific research by opening an account on the Google Scholar search engine, which also raised the visibility of scientific production of the Faculty staff.

Since the academic year 2013/2014, a new postgraduate doctoral study programme, [Chemical Engineering and Applied Chemistry](#), has been conducted at the Faculty. This doctoral study programme prepares postgraduate students for research work in the area of technical sciences, field of chemical engineering, and in the area of natural sciences, field of chemistry. Apart from the scientific training itself, one of the goals of the doctoral study programme is to strengthen the Faculty ties with research institutes and the industry. In this sense, the Faculty especially encourages the enrolment of doctoral students from scientific research institutes and the industry because it knows that this helps to develop a knowledge-based economy. Thus, for example, the tuition fee for doctoral students employed at the Ruđer Bošković Institute, which is paid from the project funds of the Croatian Science Foundation, has been reduced to 50% of the original fee. It should be noted that the above-mentioned doctoral study programme successfully passed the re-accreditation procedure in 2018 and it was awarded a “high quality label” by the expert commission. As only one doctoral dissertation was presented and defended at the moment of re-accreditation, the license was granted subject to a mandatory follow-up. At the moment, there are 122 students studying for a doctoral degree.

With its predominant research commitment and pronounced international orientation of its courses and syllabus, the postgraduate doctoral study programme promotes the fulfilment of the fundamental strategic goal of the [Research, Technology Transfer, and Innovation Strategy of Zagreb University](#). Furthermore, it promotes the immediate objectives set forth in the strategic documents at the University level and at the level of the institution of higher education, namely, the [Faculty’s Development Strategy \(2015 – 2020\)](#), [Faculty’s Development Strategy \(2021 – 2031\)](#) and the [Faculty’s Strategic Programme of Scientific Research \(2015 – 2020\)](#).

ECTS credits in doctoral studies are acquired, among other things, by publishing papers in prominent scientific journals. One requirement for a candidate to be admitted for doctoral dissertation defence should be emphasized in particular: every doctoral student is required to publish at least one article related to the topic of the doctoral dissertation in a journal listed in the Web of Science Core Collection database. However, an average number of such articles is significantly higher. The list of defended doctoral dissertations at the Faculty in the last five years can be accessed at the [corresponding link](#).

The Faculty staff regularly participates in scientific and professional conferences, including numerous plenary and keynote lectures at international scientific conferences. The total number of peer-reviewed reports of the Faculty staff from 2015 to 2021 is 1134. In the period from 2015 to 2021, the Faculty staff in academic ranks participated in the work of organising committees of 57 scientific and professional conferences (Table 5.4 of the Analytical Supplement). Some of these conferences were organised by the Faculty itself, and some by professional associations in which the Faculty staff holds management functions.

V.2 Higher education institution proves the social relevance of its scientific, professional, and artistic research as well as of knowledge transfer

The institution of higher education monitors the needs of society and of the labour market and takes them into consideration when planning its research activities.

The institution of higher education has an effective system of support for research and knowledge and technology transfer.

Teachers and associates participate in activities of scientific, artistic, and professional associations.

With the aim of intensifying cooperation with the industry, the Economic Council was constituted as an advisory body to the Dean in 2016. It consists of 11 members from the industry and five members from the Faculty. The Economic Council has so far held a number of meetings and participated in designing development and high-level projects (financed by the European Structural and Investment Funds or own funds), in the development of the syllabus of the course: Internship at Graduate Level (during preparation and execution of the corresponding project funded by the European Social Fund), in the development of a methodology of direct student scholarship scheme, etc.

In 2015, the Faculty, in cooperation with the University of Zagreb, founded the spin-off company [Comprehensive Water Technology](#). The main goal was to encourage the transfer of technology from the Faculty to economic operators in the Republic of Croatia, primarily in the field of water chemistry and environmental engineering. This was meant to promote the direct connection of science and technology with the economy and the launch of innovative projects in the field of sustainable development.

Useful information on the needs of society and the labour market are provided by the Alumni Society of Chemical Engineers and Their Friends (“AMACIZ”) whose headquarters are at the Faculty and which is led by Faculty staff. The society currently has 288 members and one of the main goals of the society is encouraging cooperation between the Faculty and the industry by strengthening personal networking. In addition, there is the Croatian Society of Chemical Engineers, an association of chemical engineers and technologists, chemists, natural persons, and legal entities operating in the territory of the Republic of Croatia and bringing together chemists, chemical engineers, and technologists for the purpose of improving chemical engineering and related professions.

The social engagement of the Faculty is confirmed by projects funded under the Efficient Human Resources programme of the European Social Fund (ESF). On project TARGET – Establishing higher education qualification and profession standards in the field of mining, geology and chemical technology, HR.3.1.15-0002, the Faculty participated as a partner of the Faculty of Mining, Geology and Petroleum Engineering of the University of Zagreb. Four projects from the same funding line are still active. On two of these, the Faculty is the project holder (graduate study programmes in the English language: Chemical and Environmental Technology, UP.03.1.1.02.0001; and CeSaR at the Faculty of Chemical Engineering and Technology, UP.03.1.1.04.0026), while on the other two it is a partner of the associations Croatian Red Cross, the City Red Cross Society of Zagreb and POZOR! – projects and education for sustainable development within the call for Strengthening of the civil society organisations’ capacities for STEM popularisation.

According to the [Ordinance on the Organisation of the Faculty of Chemical Engineering and Technology of the University of Zagreb](#), the Faculty has had the Office for International Cooperation since 2018 with two permanent employees, the Head of the Office (Ph.D.) and the Administrator (high school degree). The scope of the office is cooperation with the offices of the University of Zagreb, agencies and ministries responsible for project implementation, providing information on tenders for funding research and development

projects, collecting project proposals, administrative follow-up of contracted projects, informing project managers and project associates about the rules, procedures and documents necessary for proper project implementation, assisting in compiling financial statements for projects together with the financial department of the Faculty as well as organising the receipt and sending of reports on project activities, etc. The Office also employs temporary staff whose salaries are paid out of individual active projects.

In 2019, the Faculty Council approved a monetary fund for the foundation of [new spin-off companies of Faculty staff or students](#). The proposals are evaluated by a commission operating within the Economic Council. So far, the Faculty staff has initiated the procedure for foundation of a yet another company with the aim of licencing developed technologies and products in the field of material protection. Most of the cooperation with the industry, however, takes place directly through the Faculty, which includes expertise, analysis, synthesis and process management, product development as well as knowledge and technology transfer. The list of activities is attached in the [corresponding appendix](#). Furthermore, the Faculty staff conducts various forms of training, including courses and summer schools, primarily in the field of material protection and water and air analysis. The list of activities is attached in the [corresponding appendix](#).

Directly, or through the [spin-off company](#), the Faculty staff has cooperated with the industry also through the Croatian Agency for Small Business, Innovation, and Investment (HAMAG-BICRO) within the so called Proof of Concept Programme (PoC) intended for financing eligible pre-commercial activities of innovative scientific and entrepreneurial projects in the initial phase of development of new products, services, and technological processes. Furthermore, this includes the European Structural and Investment Funds and their call for Strengthening the Capacity for Research, Development, and Innovation in which the Faculty appears as the leader in four projects with various industry partners and the call for Increasing the Development of New Products and Services arising from research and development activities in which the Faculty participates on six projects as a partner to industrial entities. The list of activities is attached in the [corresponding appendix](#).

Faculty staff are members of numerous professional associations. The most numerous are members of the [Croatian Society of Chemical Engineers](#) (HDKI), [Croatian Chemical Society](#) (HKD) and the [Croatian Academy of Engineering](#) (HATZ). In many cases, the Faculty staff are at the heads of these associations or members of their managing bodies.

In addition, a large number of the Faculty staff are presidents or members of the organising committees of numerous scientific and professional gatherings organised by these professional associations, with the Faculty itself often in the role of the co-organiser. The list of memberships is attached in the [corresponding appendix](#).

As already mentioned in this section, the Faculty strives to better position itself in society through socially useful projects or cooperation with the industry and at the same time to promote the values it considers extremely important for society. For this purpose, the Faculty continuously develops its own promotion system and regularly informs the public of the events it organises. All of this serves primarily to present the results of its work, but it also strives to integrate the Faculty, more effectively, into all social flows. The promotion takes place on social networks ([Facebook](#), [YouTube](#)), through classical communication channels – promotional articles in [professional journals and daily press](#), activities like University of Zagreb Fair, European Researchers' Night, Science Festival, Faculty Days, Open House and by organising [workshops, round tables, and public discussions](#). The teachers participating in promotional activities regularly report to the Faculty Council.

V.3 Scientific/artistic and professional achievements of the higher education institution have been recognized in the national and international context

Teachers, associates, and the professional staff are winners of university, national and international awards, and certificates of merit for scientific/artistic/professional achievements.

The higher education institution is the holder of an appropriate number of research/artistic/professional projects (university, national and international projects).

A significant number of teachers, associates and professionals participates in keynote lectures at national and international conferences.

Teachers and associates are members of scientific/artistic/professional committees of conferences, editorial boards of journals, etc.

Since 2015, the teachers of the Faculty of Chemical Engineering and Technology have received 15 university, 17 national and 21 international awards and certificates of merit for scientific achievements. The list of awards is attached in the [corresponding appendix](#). This speaks of the high quality of the Faculty's scientific activities. A portion of these awards has been received for innovative work of teachers and associates.

Research work at the Faculty of Chemical Engineering and Technology is currently taking place within the framework of national and international projects listed in Table 5.3 of the Analytical Supplement and in the [corresponding appendix at the link](#) as well as the University grants. The appendix also contains an additional table in addition to the one generated by MOZVAG because the Poirot project database does not register Faculty teachers as collaborators on projects of other institutions. Since 2015, the Faculty has been a leader or partner in 22 international projects financed from various funds: Horizon 2020, Newfelpro/MZO, Erasmus+ KA2, Interreg Central EU, ESF, COST, CEEPUS, leader of 15 bilateral projects of the Ministry of Science and Education (MZO) and 25 projects of the Croatian Science Foundation. In 2013, financing of 47 research projects of the Ministry of Science, Education and Sports ended and the financial support for research of the University of Zagreb was activated. In the period from 2015 to 2020, the University approved 139 such grants and in 2021 another 29 were approved.

Since 2015, teachers and associates of the Faculty have held 16 keynote lectures at national and 56 at international scientific conferences. The corresponding list is in the [appendix](#). This is indicative of the fact that Faculty's teachers and associates have been recognized in the national and international context.

Since 2015, teachers and associates of the Faculty have participated in the work of scientific committees of 195 conferences. The list of these conferences can be found in Table 5.4 of the Analytical Supplement. In the same period, they have acted as members of editorial boards of 37 journals, of which they were editors-in-chief of four journals. The list of memberships in editorial boards can be found in Table 5.5 of the Analytical Supplement.

The Faculty teachers are members of the Croatian Academy of Engineering and Scientific Councils of the Croatian Academy of Sciences and Arts. The list of memberships in the academies can be found in the [appendix](#).

V.4 Scientific/artistic activity of the higher education institution is sustainable and progressive

The strategy for the development of scientific/artistic activities is in line with the vision of the development of the higher education institution.

Scientific/artistic activities of the higher education institution reflect the implementation of the strategic programme.

The higher education institution has adequate resources for scientific/artistic activities.

The higher education institution recognizes and rewards scientific/artistic achievements of its employees.

The higher education institution continuously improves its scientific/artistic activities by financing, increasing human resources, adapting space, and investing in the necessary equipment, procuring appropriate literature, supporting the dissemination of results and elaboration of doctoral dissertations.

The Faculty's strategy for the development of its scientific activities is in line with the vision of the Faculty's development, which can be observed in the corresponding [appendix](#). According to the [Faculty's Strategic Programme of Scientific Research \(2015 – 2020\)](#), one of the strategic goals of the scientific activity is the improvement of scientific activity indicators, especially quantitative indicators that include the number of published research papers and scientific projects, especially European ones, where room for progress has been identified. This strategic goal fits perfectly into the vision of the Faculty's development as set forth in the [Faculty's Development Strategy \(2015 – 2020\)](#) and the vision presented in the [Faculty's Development Strategy \(2021 – 2031\)](#), which aims to direct research in areas that can respond to local and global challenges and which relate to the development of green technologies, sustainable energy sources, Industry 4.0 and contribute to the economic growth and social progress of the EU. In line with the above-stated, the Faculty is an institution dedicated to the creation, transfer, and application of new knowledge in the field of chemical engineering, applied chemistry, materials engineering, and environmental engineering, which fits perfectly into the topics of the European Research Framework.

In the last five years, the scientific activities of the Faculty have realized the strategic plan defined in the [Faculty's Development Strategy \(2015 – 2020\)](#). From the scientific perspective, they are visible in the increase in the number of national and international projects, in the increase in the number of published scientific and professional papers and in the increase of the scope of international cooperation. The number of national research projects has increased from eight projects active in 2015 to 18 in 2020. Furthermore, the number of bilateral international projects and projects under the Horizon 2020 Programme has increased, which clearly contributes to international visibility and recognisability of the Faculty and realization of the Faculty's strategic goals. The realization of strategic goals is monitored through the quality management and assurance system which implies preparation of [annual action plans in the field of quality assurance](#), [annual reports on the implementation of these activities](#) and [Annual Self-analyses](#) quantifying all Faculty activities at the academic or calendar year level.

The Faculty of Chemical Engineering and Technology has 11 lecture halls of 669.82 m² total surface area and 45 research and teaching laboratories of 2289.73 m² total surface area and thus meets the basic spatial requirements for conducting the academic activities on all study levels (Table 4.8 in the Analytical Supplement, [explanation in the link](#)). The Faculty laboratories are equipped appropriately in accordance with various research needs. The list of capital equipment is set out in Table 4.9 of the Analytical Supplement. The resources of other higher education institutions and institutes in the Republic of Croatia are available, if necessary. In addition to laboratories in which both research and teaching activities are conducted, the Faculty has eight more laboratories of 174.11 m² total surface area intended

exclusively for research purposes. The Faculty also houses two computer classrooms with 24 and 6 computers respectively, intended for students, of 117.6 m² total surface area and the big lecture hall in the building at Marulićev trg 19 is also equipped with 60 student computers. The Faculty's Library and Information Centre procures books and scientific and professional articles for Faculty staff, provides access to [open-access literature](#) to teachers and students and lends available books and textbooks, primarily to students but also to other interested parties. The library facilities are illustrated in the Table 4.10 of the Analytical Supplement. The „high quality label“ assigned to the doctoral study programme Chemical Engineering and Applied Chemistry by the professional commission in the course of the re-accreditation process conducted in 2018 testifies to the high standard of the Faculty's scientific activity.

The Faculty continuously monitors the research activity and measures the productivity of its employees, primarily through various annual reports to the University of Zagreb, the Ministry of Science and Education, but also within the framework of its promotion system. In addition to following the national regulations that prescribe the conditions for promotion, the Faculty also has its own [Recommendations for election to academic, teaching, and associate ranks](#) by which these rules are further tightened when compared to the Requirements of the Rector's Assembly and the National Council for Science, Higher Education and Technological Development ([Decision on the Necessary Requirements for the Assessment of Teaching, Scientific and Professional Activity in the Procedure for Election to Academic Ranks](#)). In addition, one should also mention the [Scoring System for the Applicants Eligible for the Academic Rank of Assistant Professor](#). Such an approach has resulted in higher scientific productivity of the Faculty staff and consequently, greater scientific recognition of teachers. The Faculty has been encouraging its staff to apply for competitions such as the Fran Bošnjaković or Andrija Mohorovičić Awards of the University of Zagreb, Awards of the Society of University Teachers and Other Scientists in Zagreb, Rikard Podhorsky and Vera Johanides Awards of the Croatian Academy of Engineers, Vladimir Prelog Award of the Croatian Chemical Society and of the Pliva company, UNESCO-L'Oréal Women in Science Awards and – the most important of all – the National Science Award received by numerous Faculty teachers. The Faculty itself grants the Franjo Hanaman Award for promoting the name of the Faculty and, since 2015, the Ivan Plotnikov Annual Award for Young Scientists who publish papers in high impact journals.

The Faculty invests its own funds in raising the quality of scientific and teaching activity (see Tables 4.11, 4.12 in the Analytical Supplement and the Faculty's [Financial Plan](#)). In addition to the new look, the big lecture hall at Marulićev trg 19 has received modern conference equipment, including 60 laptops and projectors. A procedure has been introduced whereby all employees can replace their obsolete computers after five years. The Faculty has recently responded to a call for co-financing the renovation from its own funds and the funds of the Ministry of Science and Education and thus renovated the lecture hall seating 80 students at Savska cesta 16 and some student laboratories. Offices and laboratories at individual departments are regularly renovated with Faculty's own funds. In the last five years, the Faculty has engaged 11 new assistant professors in order to strengthen its scientific activity, which has reduced the teaching load of the existing staff and thus created better opportunities for scientific progress. This was especially evident in 2020 when the number of projects received from the Croatian Science Foundation doubled. The Faculty has been adapting the existing premises for the purpose of tailoring them for the organisation of new and modernization of the existing laboratories, which is related to employment of new assistant professors, their installation projects of the Croatian Science Foundation and introduction of new research areas. One such example is the establishment of the Laboratory for Additive Production. At the end of 2018, the Faculty Board sent to its departments the

Call for Expression of Interest in funding or co-funding of improvement and modernization of student laboratory exercises. Based on that call, the Faculty funded the acquisition of equipment worth around one million Croatian Kuna (Department of Mechanical and Thermal Process Engineering, Department of Analytical Chemistry, Department of Physical Chemistry, Department of Electrochemistry, etc.).

The Faculty has been continuously investing in procurement of professional and scientific literature and new research equipment. In the last two years, equipment worth around 7 million kuna has been purchased, and equipment worth a total of 13 million kuna is currently being procured.

Dissemination of results and preparation of doctoral dissertations has been supported through scientific and professional projects and with the funds of the University of Zagreb allocated through calls for academic mobility.

V.5 Scientific/artistic and professional activity and achievements of the higher education institution improve the teaching process

The premises and equipment for scientific/artistic research and professional activity are used in undergraduate, graduate, and postgraduate teaching.

Undergraduate, graduate, and postgraduate students participate in research/artistic/professional projects of the higher education institution.

University postgraduate classes and doctoral dissertations reflect scientific/artistic research, professional activity, and achievements of the higher education institution.

As many as [45 laboratories, out of a total of 56](#) at university departments, are used both for research and teaching purposes (see Table 4.8 of the Analytical Supplement). The scientific and teaching activities of the Faculty are closely intertwined on all levels of study, for example, through laboratory exercises in undergraduate and graduate study programmes as an integral part of the teaching process and during the preparation of final and gradual theses and doctoral dissertations, many of which get published in [scientific publications](#). The laboratories are adequately equipped to carry out these activities.

In addition to classic laboratories, there are two computer classrooms with 24 and 6 computers, respectively, which are used for teaching, research, exercises, and the work with students. Up-to-date software for engineering calculations is installed on all computers and students have free access to online scientific literature. Students can also use the resources of the BIC, a well-equipped faculty library (see Table 4.10 of the Analytical Supplement).

Students of the Faculty are involved in research and professional projects, which is [easily proven](#) by numerous final and graduate theses and doctoral dissertations whose topics are directly related to project topics. Furthermore, the Faculty conducts mentoring exercises in the first year of graduate study, the topics of which are predominantly related to the topics of national (Croatian Science Foundation) and international projects (Horizon 2020, bilateral projects) and projects funded by EU funds. In addition, students participate in projects by writing student research papers that compete for the Rector's or the Dean's Award. In the last five years, 161 students of the Faculty have received the Rector's Award and another 88 the Dean's Award. In the last five years, 144 published research and professional papers have been co-authored by undergraduate, graduate, and doctoral students, which makes up 23% of the total number of papers.

An example of the connection between scientific research, professional activity and undergraduate and graduate teaching is the Environmental Engineering Laboratory – the

course belonging to the graduate study of Environmental Engineering. At the beginning of the academic year, the student chooses the topic of the paper and the mentor. During the academic year, students work on chosen topics starting from searching scientific and professional literature, through establishing analytical methods necessary for the follow-up of a given process or reaction, collecting results by laboratory research all the way to computer data processing. During the academic year, students are required to hold four presentations before their fellow student and professors who have mentored them and, in addition, they are required to write a final report containing all necessary elements. The topics of these papers are most often related to research and professional projects implemented at the Faculty. At each graduate study of the Faculty, this type of exercise is present, and the same or similar implementation rules are applied, which clearly shows the connection between the scientific and the professional activity and teaching at the graduate level.

A similar example can be found in undergraduate study programmes because the topics of final papers are very often related to research and professional projects conducted at the Faculty.

Apart from the natural connection between the teaching and scientific activities of the Faculty, there is also a motivation arising from the conditions of the Rector's Assembly for teacher advancement (official gazette NN 106/2006 official gazette NN 122/2017), which prescribe that teachers publish a certain number of papers co-authored by students whom they mentor on [final or graduate papers](#).

Classes at the postgraduate, doctoral study is organised in the form of compulsory and elective courses and workshops. The course coordinators are Faculty members and active scientists elected to academic ranks, external associates in appropriate academic ranks and employees of other scientific and educational institutions, in the country and abroad, who are internationally prominent in their field and who, at the same time, significantly contribute to the quality of the doctoral study. A professor emeritus can also take part in teaching as a course coordinator or co-coordinator of a doctoral study course. When appointing a doctoral dissertation mentor, due care is taken that the competencies of the mentor are related to the topic of the doctoral dissertation, as evidenced by the list of published research studies on a topic related to the topic of the doctoral dissertation in the last five years, in the appropriate University forms. All Faculty teachers elected to academic ranks can potentially be mentors of doctoral dissertations if they have appropriate competencies in the field of research of the doctoral dissertation in question.

The curriculum of the doctoral study is focused on the doctoral student's field of research. The doctoral student enrolls in two compulsory and three elective courses. The examinations are taken partly in the form of term papers that are related to the topic of the doctoral dissertation. In agreement with the mentor, doctoral students can choose other courses from related study programmes at the University of Zagreb or other universities. Other mandatory obligations include: a research seminar, a workshop for developing transfer or generic skills, a discussion group, publishing a paper in a journal cited in the Web of Science Core Collection database and participating in a scientific conference report. In doing so, the candidate is required to earn ECTS credits in each of these mandatory forms of work. In this way, the connection between the teaching and scientific activities of the Faculty in doctoral studies is ensured and the results from the doctoral dissertations provide a guarantee of the connection between scientific research and professional activities of the Faculty.