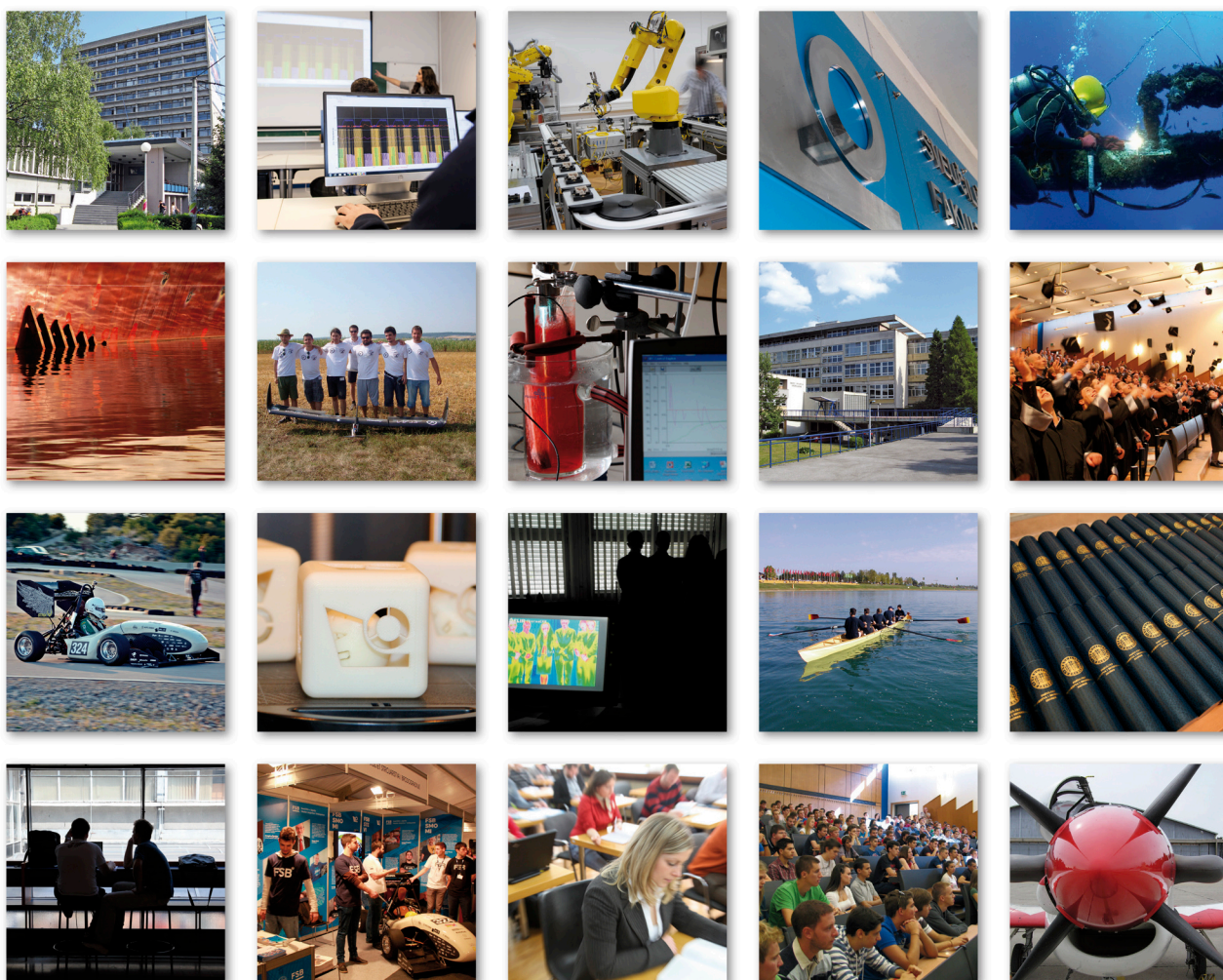


Self-evaluation



Sveučilište u Zagrebu
Fakultet strojarstva i brodogradnje

University of Zagreb
Faculty of Mechanical Engineering and Naval Architecture

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Self-evaluation

University of Zagreb
FACULTY OF MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE
Zagreb, Ivana Lučića 5

Class: 602-04/17-1/52
File No.: 251-66-1071-17-8

Zagreb, 19 November 2017

Name of the higher education institution (HEI):

University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture

Name of the university of which the institution is a constituent: **University of Zagreb**

Year of establishment: **1967**

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Name and academic rank of the head of the HEI: **PhD Zvonimir Guzović, full professor, dean**

Name of the bank and the account number of the HEI:

Zagrebačka banka, account number: 2360000-1101346933

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SVEUČILIŠTE U ZAGREBU
FAKULTET STROJARSTVA I BRODOGRADNJE
Zagreb, Ivana Lučića 5

Zagreb, 29. rujna 2017.

Klasa: 602 - 04 / 17 - 1 / 52

Urbroj: 251 - 66 - 1701 - 17 - 6

Fakultetsko vijeće Sveučilišta u Zagrebu, Fakulteta strojarstva i brodogradnje na svojoj 11. redovnoj sjednici održanoj 19. rujna 2017. godine na prijedlog Dekana, a u skladu s člankom 27. Statuta Fakulteta strojarstva i brodogradnje, donijelo je sljedeću

O D L U K U

Imenuju se članovi Povjerenstva za samoanalizu i reakreditaciju, u slijedećem sastavu:

1. prof. dr.sc. Zvonimir Guzović
2. prof. dr.sc. Dubravko Majetić
3. prof. dr.sc. Zdenko Tonković
4. prof. dr.sc. Goran Đukić
5. prof. dr.sc. Damir Markučić
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10. prof. dr.sc. Sanja Singer
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Dostaviti:

1. Članovi Povjerenstva
2. Tajnik Fakulteta
3. Tajnik upravljanja
4. Pismohrana

Dekan

Prof. dr.sc. Zvonimir Guzović



Introduction

The Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, is the oldest and the largest faculty in the field of mechanical engineering in the Republic of Croatia. Since the first lectures held at the Royal Technical College in 1919 the Faculty has been providing state-of-the-art education in its mechanical engineering and naval architecture courses and since 1995 in the aeronautical engineering course too, successfully combining general and expert knowledge. The development of the Faculty is based on the developments in the fields of design, materials, energy engineering, production and organization.

The concept of the studies and the designed course syllabi are similar to the curricula of such studies at the prestigious European universities, which contributed directly to the fact that the Faculty is one of the leading engineering faculties both of the University of Zagreb and in Croatia.

The Faculty provides teaching excellence in engineering sciences educating future engineers for different industries. Currently, it offers undergraduate and graduate programmes in three courses of study: mechanical engineering, naval architecture and aeronautical engineering. Graduate students may pursue a professional or scientific career in many areas, such as design and production, process management, exploitation and maintenance of production systems, and design and operation of manufacturing systems across industries. In addition to theoretical knowledge, taught by highly qualified teachers from 14 departments and 41 chairs, practical knowledge is an important component of the education at the Faculty and it can be acquired both in 51 laboratories and through intensive collaboration with industry.

The Faculty has approximately 400 staff, 240 of them are teaching and research staff from full professors to junior researchers and research assistants. There are now over 2,300 students enrolled in the study programmes.

History, organization, mission, vision and strategy of the Faculty

There have been several key and influential events in the history of the Faculty. In 1898 the Society of Engineers and Architects launched an initiative to establish a technical college, and in 1919 the Royal Technical College was established. Out of nine courses of study that had been offered by the Technical College, there are nowadays still three courses offered by the Faculty: mechanical engineering, naval architecture and marine engineering. In 1926 the Technical Faculty with its Departments of Architecture, Civil Engineering, Geodesy, Mechanical Engineering, Naval Architecture, Electrical Engineering, Chemical Engineering and Technology, and Mining Engineering became a constituent of the University of Zagreb. In 1956 the Faculty of Mechanical Engineering and Naval Architecture was set up after the division of the Technical Faculty into independent faculties based on specialized areas of activity. On 22 May 1967, the Post-Secondary Technical School was merged with the Faculty of Mechanical Engineering and Naval Architecture. The Faculty was offering three courses of study, Mechanical engineering and design, Mechanical engineering and production, and Naval Architecture, and was organized in 25 chairs and 17 departments. In 1995 the Faculty introduced the course in aeronautical engineering, the first of this kind in Croatia. The Faculty was also the first faculty in Croatia to implement the study programmes according to the criteria of the Bologna process enrolling the first generation of students under the new system in the academic year 2003-2004, two years before any other higher education institution in Croatia. In 2014 the Faculty was awarded a Certificate of harmonization of the quality assurance system with the Standards and Guidelines for Quality Assurance Systems in the European Higher Education area (ESG), which confirmed that the quality assurance system of the Faculty is efficient and at an advanced stage of development based on the criteria set by the Agency for Science and Higher Education for the periodic external evaluation of quality assurance systems of higher education institutions of the Republic of Croatia. The last change in the organization of the Faculty took place earlier this year when a new Department of Fluid Mechanics with constituent chairs, and six new laboratories were established.

The Faculty of Mechanical Engineering and Naval architecture now comprises 14 departments and three independent chairs (chairs not affiliated with a department). The departments are further divided into chairs and laboratories; in total there are 41 chairs (including the three independent chairs) and 51 laboratories. The organizational structure of the Faculty is presented in Fig. 1.1.

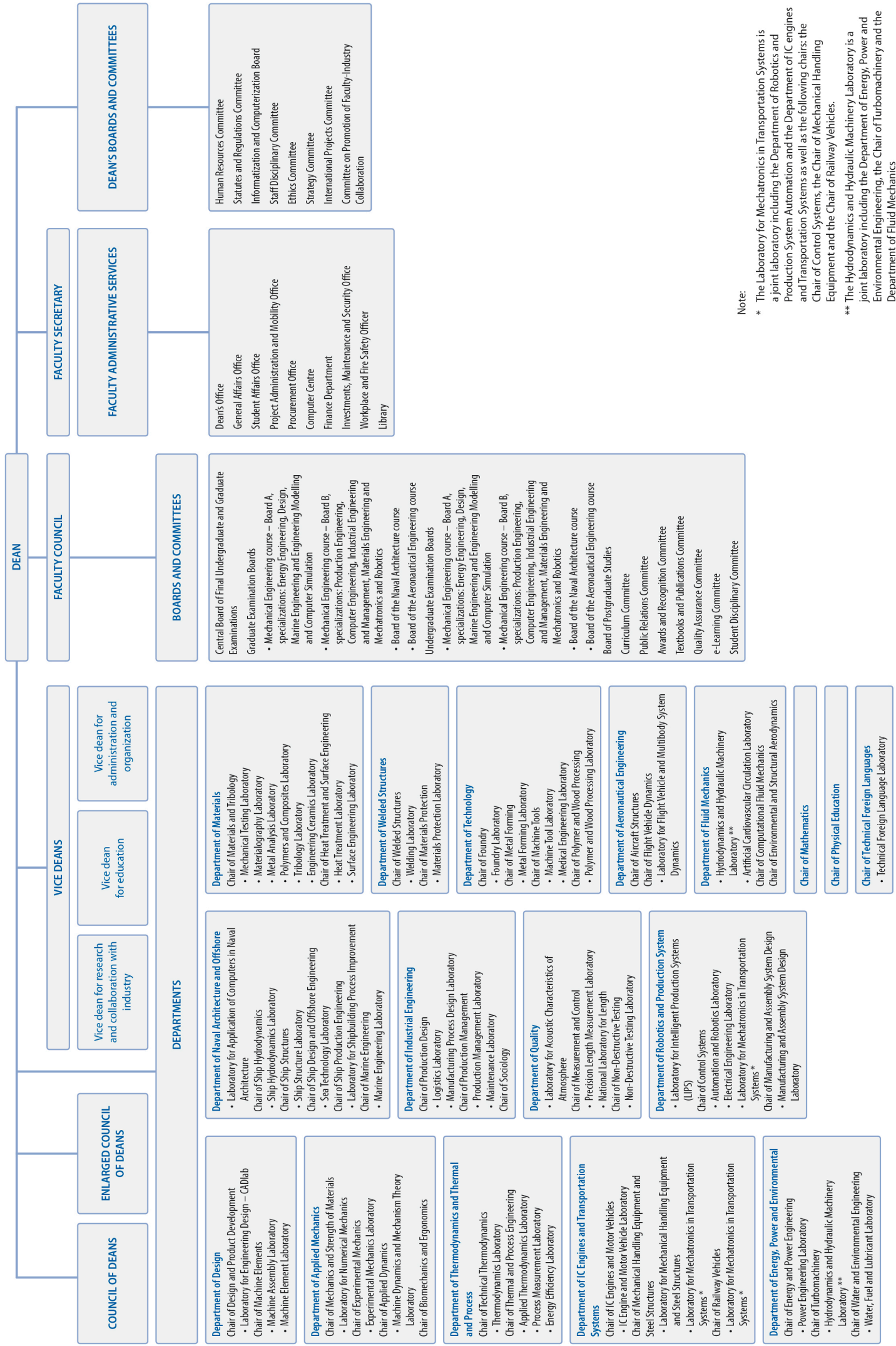


Fig 1.1 Organizational structure of the Faculty

Elements of the organisational structure and their function:

The Dean and the Faculty Council are governing bodies of the Faculty.

The Dean works with his fellow **vice deans** and **the secretary** of the Faculty. The **Council of deans** is an advisory body providing advice to the dean. In its narrow form it comprises the dean, the vice deans and the secretary of the Faculty.

The dean's standing expert and advisory boards and committees are:

1. Human Resources Committee
2. Statutes and Regulations Committee
3. Informatization and Computerization Board
4. Staff Disciplinary Committee
5. Ethics Committee
6. Strategy Committee
7. International Projects Committee
8. Committee on Promotion of Faculty-Industry Collaboration.

The Faculty Council is the board of experts of the Faculty. Permanent members of the Faculty Council are:

1. Dean
2. Vice deans
3. representatives of teachers holding research and teaching ranks
4. one representative of lecturers and senior lecturers
5. three representative of assistants and postdoctoral researchers
6. head of the library
7. staff representative who was selected from among candidates put up by the Union and the Council of deans
8. head of a legal entity / legal entities established by the Faculty
9. student representatives
(Student representatives make 15% of the total number of all members of the Faculty Council as listed above. Out of the total number of student representatives six of them are students of undergraduate and graduate studies, and the rest are students of postgraduate studies.)

The representatives listed under 3, 4, 5, 7, and 8 above serve two-year terms and are eligible for re-election. Student representatives serve one-year terms and are eligible for re-election too.

Members of the staff whose presence in the Faculty Council meeting is required due to particular agenda items (chairs of the Dean's committees, heads of the studies, chairs of standing bodies of the Faculty Council, chairs of the academic staff selection committees, doctoral advisors, and others) as well as the secretary of the Faculty and the chief administrative officer attend the Faculty Council meetings by invitation with no voting rights.

The Faculty Council sets up standing and temporary committees and other bodies for the purpose of examining particular issues, preparing decision drafts or carrying out particular tasks from their scope of work. The standing expert and advisory committees of the Faculty Council are:

1. Central Board of Final Undergraduate and Graduate Examinations
2. Graduate Examination Boards
3. Undergraduate Examination Boards
4. Board of Postgraduate Studies

5. Curriculum Committee
6. Public Relations Committee
7. Awards and Recognition Committee
8. Textbooks and Publications Committee
9. Quality Assurance Committee
10. e-Learning Committee

Organizational units of the Faculty are departments, independent chairs, the library and the Dean's office.

The **departments** have been established in accordance with their respective teaching and research activities. Chairs and laboratories are constituents of the departments. Some laboratories do not necessarily belong to a chair; such laboratories belong directly to the department.

Activities belonging to scientific disciplines other than engineering are carried out by members of the **independent chairs**.

Laboratories belonging to the departments or the chairs are responsible for carrying out adequate research, teaching and professional tasks.

The Faculty is entered into the Register of Scientific Institutions in the area of engineering sciences, the fields 2.02 naval architecture, 2.11 mechanical engineering and 2.14 aeronautical, rocket and aerospace engineering.

The Faculty is a constituent of the University of Zagreb. Although a legal entity and public institution in its own right, the Faculty operates under the name of the University and its own name. The rules of conduct, included in the Statutes and other regulations of the University, have been established by the University. The Statutes and the Regulations on the internal organization of the Faculty enter into force only when approved by the University. The University bodies comprise representatives of the Faculty who participate in their activities.

The valuable role the Faculty has within the University can be demonstrated by the following activities:

- participation in joint projects of the University, such as doctoral studies, e-learning, Round table on the future of shipbuilding, Round table on energy engineering, etc.
- teachers of the Faculty take part in bodies and boards of the University of Zagreb (the Senate, the Council of Engineering Sciences, Enlarged Council of Rectors, Quality Assurance Committee, etc.)
- the Faculty is responsible for other university studies (the military university study programmes Military Engineering and Military Leadership and Management in collaboration with other faculties of the University of Zagreb and the Croatian Military Academy; the undergraduate university study programme in Energy Efficiency and Renewable Energy Sources in Šibenik in collaboration with the Faculty of Electrical Engineering and Computing; the studies at the School of Design at the Faculty of Architecture in collaboration with five faculties of the University) and some teachers teach courses in undergraduate, graduate and postgraduate studies at other faculties of the University.

The Faculty has an important role and responsibility in the areas of science, profession, education and society of the Republic of Croatia in general. It is the institution with the longest tradition in its field (97 years of existence), consequently we have the greatest responsibility for the development of the profession and for research and professional activities. Education of high-quality engineers is of utmost importance for the future economic and social development of Europe, in the context of building a competitive knowledge-based European economy in particular. A position in such an environment can be ensured only by devoting constant effort and making investment in the quality education Croatian engineers are to be provided with.

VISION

In the long term (up to 2025), The Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, aims to position itself as one of the leading institutions in the fields of mechanical engineering, naval architecture and aeronautical engineering in South Eastern Europe. Through research and teaching, it strives to occupy a crucial role in fostering the development and progress in Croatia's economy, based on innovations.

MISSION

The Faculty's mission is to educate innovative and creative leaders by combining research and teaching and to disseminate new scientific knowledge gained through research, all for the benefit of the Croatian economy and society. The Faculty is committed to innovation in research and teaching, creating scientific breakthroughs and educating experts able to actively and effectively pursue lifelong learning and advancement.

The Faculty is accomplishing its mission by educating students in undergraduate, graduate and postgraduate doctoral and specialist studies as well as in summer schools and lifelong learning programmes in the areas of mechanical engineering, naval architecture and aeronautical engineering. In the area of mechanical engineering the Faculty offers a wide range of specializations, which are organized as specialized studies in some countries.

A number of research projects are being carried out at the Faculty, as can be seen in Table 5.3a.

The Faculty is open to engaging in collaborations with industrial partners through projects and education of postgraduate doctoral students who prepare a dissertation financed by companies, as well as through preparation of studies and expert opinions, performing measurements and calibrations, and through certifications, etc. Also, the students undergo student training in companies and the Faculty organizes field trips to the best Croatian companies.

The Faculty is achieving its vision of becoming part of the European network through a variety of European research, teaching and cohesion fund projects, bilateral projects and exchange programmes for students, teachers and non-teaching staff.

The vision of the Faculty as a centre of creation and transfer of advanced engineering knowledge is achieved through the establishment of centres of excellence, where experts in particular fields gather and offer solutions to complex problems to industrial communities. About 20 associations, mostly chaired by our teachers, are affiliated to the Faculty.

[The Development Strategy of the Faculty \(2014-2025\)](#) includes the aims of the Research and Innovation Strategy, Education Strategy, Stakeholder Engagement Strategy and Organization and Management Strategy.

A significant component of the Faculty's activities is [quality assurance](#), the main concern of the Quality Assurance Committee. The Committee undertakes and co-ordinates evaluation processes at the Faculty and is responsible for developing internal mechanisms for quality assurance and improvement with the authorization given by the Faculty Council. The tasks and responsibilities of the Committee have been specified in the [Regulations on the Quality Assurance System](#).

The previous evaluations, e.g. Self-evaluation 2012 and Periodic external evaluation of the quality assurance system 2014, resulted in the issuing of the licence and certificate of harmonization of the quality assurance system with the Standards and Guidelines for Quality Assurance Systems in the European Higher Education area as well as in the action plans for improvements based on the recommendations given in the re-accreditation evaluation reports and reports on the periodic external evaluation of the quality assurance system.

The undergraduate study programmes are seven semesters in length and the graduate programmes three semesters. It is typical of the undergraduate and graduate mechanical engineering study programmes that the Faculty offers a wide variety of specializations and sub-specializations, which is closely related to successful development of research, laboratories and teaching in many branches of mechanical engineering through almost a hundred years of the faculty tradition. In addition to mechanical engineering in the narrow sense, the disciplines that are at many foreign universities often organized as separate studies, such as materials sciences, production engineering, industrial engineering, and mechatronics and robotics, are also part of the curriculum.

Such a programme structure enables the students to acquire generic competences as well as:

- fundamental engineering competencies resulting in flexibility on the labour market when seeking employment in different economic sectors (horizontal employment), and
- specific expert competencies required for efficient and fast engagement in business processes in specific branches of the profession (specialization as employability factor).

The courses taught in the first year, i.e. the first two semesters of the undergraduate studies are common to the all three courses of study. The students acquire the fundamental knowledge in mathematics, physics, chemistry, engineering graphics and computer software tools. The corresponding topics of these areas are included in the engineering oriented courses in mechanics, strength of materials and materials science. In the first semester a course in Sociology is also taught, giving an insight into social and cultural aspects of life in a modern society.

In the second year of the undergraduate study in mechanical engineering students apply for a desired specialization in an internal competitive application process. Nine specializations are offered with the following student quotas:

▪ Design	115
▪ Process and Energy Engineering	90
▪ Production Engineering	90
▪ Marine Engineering	30
▪ Engineering Modelling and Computer Simulation	30
▪ Computer Engineering	30
▪ Industrial Engineering and Management	30
▪ Materials Engineering	30
▪ Mechatronics and Robotics	30

The three traditional specializations, Design, Process and Energy Engineering, and Production Engineering, as well as the Computer Engineering specialization have their sub-specializations. Student quotas are established by the Faculty Council every year in accordance with the existing resources (teachers, classrooms, laboratories).

The postgraduate studies are organized as follows:

1. Three-year PhD studies in **Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgy**. The programmes are carried out in collaboration with the Faculty of Metallurgy in Sisak and include different specializations. Students select a specialization when applying for admission to a programme. Eleven specializations are related to the scientific fields of mechanical engineering, naval architecture and offshore engineering, metallurgy, and aeronautical, rocket and aerospace engineering:
 - Naval Architecture and Offshore Engineering
 - Industrial Engineering and Management
 - Materials Engineering
 - Mechatronics and Robotics

- Metallurgical Engineering
 - Advanced Manufacturing Technologies
 - Computational Mechanics
 - Process and Energy Engineering
 - Design Theory
 - Measurement in Mechanical Engineering
 - Aeronautical Engineering
2. One-year postgraduate specialist study (two semesters) for graduate students seeking professional development. Students choose one of the offered fields of specialization when applying for admission to the programme:
- Industrial Engineering and Management
 - Materials Engineering
 - Structural Analysis and Design
 - Assembly and Packaging
 - Advanced Manufacturing Technologies
 - Polymer Engineering
 - Offshore Structures
 - Product Lifecycle Management

In collaboration with other faculties of the University of Zagreb and the Croatian Military Academy the Faculty is responsible for the university undergraduate study programmes in Military Engineering and Military Leadership and Management, as well as for the undergraduate university study programme in Energy Efficiency and Renewable Energy Sources in Šibenik in collaboration with the Faculty of Electrical Engineering and Computing.

Description of the process of compiling the Self-Evaluation report

Upon invitation by the Croatian Agency for Science and Higher Education (AZVO) to participate in this re-accreditation the Dean and the Vice deans proposed members of the staff who were to become a committee responsible for compiling a Self-Evaluation report and for carrying out the re-accreditation process.

At its session held on 19 September 2017 The Faculty Council appointed the **Self-Evaluation and Re-accreditation Committee** comprising:

1. Prof. dr. sc. Zvonimir Guzović (dean)
2. Prof. dr. sc. Dubravko Majetić (vice dean for research and collaboration with industry)
3. Prof. dr. sc. Zdenko Tonković (vice dean for administration and organization)
4. Prof. dr. sc. Goran Đukić (vice dean for education)
5. Prof. dr. sc. Damir Markučić (former vice dean, chair of the Quality Assurance Committee)
6. Prof. dr. sc. Ivanka Boras (former vice dean, chair of the Curriculum Committee)
7. Prof. dr. sc. Tanja Jurčević Lulić (former vice dean, co-ordinator for students with disabilities)
8. Prof. dr. sc. Krešimir Grilec (chair of the Awards and Recognition Committee)
9. Prof. dr. sc. Joško Parunov (chair of the Board of Postgraduate Studies)
10. Prof. dr. sc. Sanja Singer (chair of the Human Resources Committee)
11. Dr. sc. Milan Vrdoljak, associate professor (chair of the e-Learning Committee)
12. Dr. sc. Dragan Žeželj, assistant professor (ECTS coordinator)

The Committee members have worked in five teams to cover the assessment areas as follows:

1st assessment area: Internal quality assurance and the social role of the higher education institution

Prof. dr. sc. Damir Markučič – team leader

Prof. dr. sc. Zdenko Tonković

Prof. dr. sc. Dubravko Majetić

2nd assessment area: Study programmes

Prof. dr. sc. Ivanka Boras – team leader

Prof. dr. sc. Tanja Jurčević Lulić

Prof. dr. sc. Goran Đukić

3rd assessment area: Teaching process and student support

Prof. dr. sc. Goran Đukić – team leader

Dr. sc. Dragan Žeželj, assistant professor

Dr.sc. Milan Vrdoljak, associate professor

4th assessment area: Teaching and institutional capacities

Prof. dr. sc. Tanja Jurčević Lulić – team leader

Prof. dr. sc. Goran Đukić

Prof. dr. sc. Sanja Singer

5th assessment area: Scientific activity

Prof. dr. sc. Krešimir Grilec – team leader

Prof. dr. sc. Dubravko Majetić

Prof. dr. sc. Joško Parunov

During the period of preparation for the self-evaluation and during the process of compiling the report on self-evaluation the following members of the Faculty staff (members of the Committee and administrative staff) participated in numerous workshops:

- Workshop on compiling a self-evaluation report, 5 July 2017, participants: prof. dr. sc. Goran Đukić, vice dean for education, prof. dr. sc. Tanja Jurčević-Lulić, committee member, Silvana Škoko-Gavranović, ISVU coordinator
- Workshop on learning outcomes for representatives of higher education institutions, 20 September 2017, participants: prof. dr. sc. Goran Đukić, vice dean for education, prof. dr. sc. Tanja Jurčević-Lulić, committee member, prof. dr. sc. Mladen Crneković, co-ordinator of the Mechatronics and Robotics specialization
- Workshop on data entry and verification in the upgraded systems MOZVAG and CROSBİ, 10 October 2017, participants: Silvana Škoko-Gavranović, ISVU co-ordinator, dr. sc. Tamara Krajna, CROSBİ database administrator
- Meeting with representatives of higher education institutions that take part in this particular process of re-accreditation, 11 October 2017, participant prof. dr. sc. Goran Đukić, vice dean for education
- Workshop on input and verification of data in the upgraded CROSBİ database, 26 October, 2017, participants: dr. sc. Tamara Krajna, CROSBİ database administrator, Jelena Devčić, MEcon, research project database administrator
- Workshop on data entry and verification in the upgraded MOZVAG system, 27 October, 2017, participants: Silvana Škoko-Gavranović, ISVU co-ordinator, Petra Škaberna, graduate journalist, Project Administration and Mobility Office

- Internal workshop on data entry in the MOZVAG system, 6 November 2017, participants: all administrators using MOZVAG and representatives of SRCE and the Agency for Science and Higher Education (AZVO)
- Internal workshop on data entry in the MOZVAG system, 14 November 2017, participants: all administrators using MOZVAG and representatives of SRCE and the Agency for Science and Higher Education (AZVO)

The Dean appointed the following persons responsible for data entry and processing in MOZVAG, the directory of accredited study programmes:

- Silvana Škoko-Gavranović, ISVU co-ordinator, responsible for entry of data on study programmes
- Dr. sc. Tamara Krajna, head of the Library, responsible for entry of data on research activities stored in the CROSBİ database
- Andreja Eškić, BPA, head of the Student Affairs Office, responsible for entry of student data
- Izidora Herold, Final Undergraduate and Graduate Examinations officer, responsible for entry of data on undergraduate, graduate and postgraduate students and student mobility
- Ankica Mihaljević, graduate economist, graduate economist, head of the Finance Department, responsible for financial data entry
- Petra Škaberna Blažević, graduate journalist, adviser on international projects and mobility, responsible for entry of data on mobility of teaching and administrative staff and on research and professional projects
- Biserka Domitran, Human Resources (HR) officer, responsible for entry of HR data
- Mr. sc. Nina Antičić, graduate economist, head of the Project Administration and Mobility Office, responsible for entry of data on mobility of teaching and administrative staff and on research and professional projects
- Jelena Devčić, MEcon – adviser on international projects and mobility, responsible for entry of data on mobility of teaching and administrative staff and on research and professional projects

Also, within the Faculty's Atlantis system the staff of the Computer Centre have created a folder for entering reports on particular assessment areas and for monitoring the process. Several meetings of members of particular teams and committees as well as meetings and consultations with the administrative staff were held. The Dean and Vice deans co-ordinated the activities of the staff members who were responsible for collecting the data from teachers, research staff and administrative services and for entering the data into the MOZVAG system.

For the purpose of compiling the Self-evaluation report data from different data bases (ISVU, CROSBİ, projects data bases) data stored in the Faculty's internal data bases (Atlantis, Infomare) and data held by particular offices have been used. A number of already existing documents were also used, such as [Self-Evaluation report 2012](#), [Report on internal assessment of the quality assurance system 2014](#), [Report on the results of the Periodic external evaluation of the quality assurance system](#), [Activity Plans](#) based on previous evaluations, annual reports on the quality assurance system, annual plans for quality assurance at the Faculty, Dean's annual reports etc., as well as the Faculty regulations, such as the [Statutes](#), [The Regulation on the Faculty organization and job classification](#), [The Regulations on undergraduate and graduate studies](#) i [The Regulations on quality assurance system](#).

The Self-evaluation report was adopted by the Faculty Council at its regular meeting held on 19 November 2017. The Self-evaluation report contains Introduction and five chapters (94 pages) and attached tables generated by the MOZVAG system.



**Internal quality assurance
and the social role of the higher
education institution**

1.1. The higher education institution has established a functional internal quality assurance system

Internal quality assurance system includes 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/artistic activity, professional activity, etc.) and provides underlying documentation.

Internal quality assurance system seeks to involve all stakeholders of the higher education institution (students and external stakeholders – employers, alumni, representatives of professional organisations, civil society organisations and internal stakeholders).

The higher education institution adopted a quality assurance policy, which is a part of its strategic management and is achieved through the implementation of the strategy, including the research strategy, involving a period of at least five years.

The implementation of the strategy includes SWOT or similar analysis, strategic goals, programme contract goals (where applicable), operational plan, defined responsibilities for implementation, monitoring mechanisms and the report on its implementation. The stakeholders recognize the strategy as an effective tool for improvement.

The higher education institution systematically collects and analyses data on its processes, resources and results, and uses them to effectively manage and improve its activities, as well as for further development.

The higher education institution is committed to the development and implementation of human resource policies (managerial, scientific-teaching, artistic-teaching, administrative, professional and support resources), in accordance with professional principles and standards.

The internal quality assurance system of the Faculty is an integral part of the common quality assurance and improvement system of the University of Zagreb. The quality assurance system (QAS) includes and evaluates all activities of the Faculty (study programmes, teaching process, student admission and progression, student support, learning resources, research and professional activities, etc.). The system is being efficiently improved and further developed based on the results of internal and external evaluation.

The efficiency and the stage of development of the system were officially acknowledged by the CERTIFICATE issued upon completion of the periodic external evaluation of the quality assurance systems, carried out by the Agency for Science and Higher Education (AZVO) in the academic year 2014-2015. [The Certificate](#), issued in September 2015 for the period of five years, acknowledges that the quality assurance system meets the Standards and Guidelines for Quality Assurance Systems in the European Higher Education area and that it is at an advanced stage of development.

Information about activities, results and documents of the QAS are available on the websites that give information about quality ([Quality Assurance System](#)). The fundamental documents of the QAS of the Faculty are:

- [Quality Assurance Policy](#)
- [Regulations on the Quality Assurance System](#)
- [Quality Assurance Manual](#)
- Reports on activities of the Quality Assurance Committee
- Student satisfaction surveys

The Regulations on the Quality Assurance System of the Faculty specify that the Quality Assurance Committee shall comprise 12 members: representatives of all teaching, research and professional processes, a representative of external stakeholders, a student representative and two representatives of non-teaching/administrative staff. In the Quality Assurance Manual mechanisms of monitoring the results of particular activities of the quality assurance system of the Faculty are defined and indicators of completed

activities are specified. The internal evaluation is one of the mechanisms for the monitoring and analysis of the system efficiency and its effect on the quality of teaching, research and professional activities of the Faculty. The report on the internal quality assurance system evaluation is the basis for planning activities required to improve and further develop the system.

[The Faculty Statutes](#) and the [Strategy 2014-2025](#) are made available on the websites of the Faculty. The Strategy Committee drafted the [Short-term Action Plan](#) which was adopted by the Faculty Council at its 7th regular meeting on 21 April 2015. This Action Plan defines activities, responsibilities, indicators and monitoring mechanisms that are used to monitor the implementation of the strategic documents. Annual work plans of the QAS are also available on the websites of the Faculty; they are discussed in the meetings of the Dean's and Faculty Council's boards and committees as well as in the department and chair meetings to be subsequently adopted by the Faculty Council.

The Quality Assurance Committee continuously co-ordinates and monitors the activities of quality assurance and improvement. The Committee co-ordinates the preparation of annual reports in which the effects of the completed activities are evaluated, that were planned in the previous annual work plan for the previous academic year, and these reports are also the starting point for planning activities in the next academic year. The reports and plans are regularly, i.e. annually, discussed in the Faculty Council meetings and adopted by the Faculty Council. The agendas of the Faculty Council meetings regularly include items related to the field of quality assurance and implementation of the strategy of the Faculty, and if required, topical meetings of the Faculty Council are held.

The permanent activities of the QAS in all areas can be seen in annual reports presented by the Dean at the Faculty Council meetings. The Dean's report includes the indicators and the analysis of the teaching activity, research and collaboration with industry, research productivity; the analysis of human resources (teaching and non-teaching staff), financial operations, investments and maintenance and the organization of the Faculty. In addition, the Faculty Board (i.e. the governing body comprising the Dean and Vice deans) regularly reports on these activities in the meetings of the Enlarged Council of Deans and the Faculty Council, which is recorded in the minutes of the meetings kept in the Atlantis system ([intranet](#)).

Since the implementation of the QAS numerous stakeholders have been included in particular activities, i.e. areas of activity of the Faculty bodies, depending on their importance. For example:

- Representatives of the teaching and non-teaching staff, teaching assistants, students and an external stakeholder (an alumnus coming from industry or the community) participate in the activities of the Quality Assurance Committee ([Resolution, Faculty Council body no. 15, page 5](#)).
- Representatives of the teaching and non-teaching staff and a Union representative participate in the activities of the Quality Assurance Committee ([Resolution, Faculty Council body no. 1, page 8](#)).
- Two students are members of the Curriculum Committee, the Public Relations Committee, Ethics Committee and Student Disciplinary Committee, while one student is a member of the e-Learning Committee, which means that the input received by students is included in the quality assurance system ([Resolution, Faculty Bodies 2016-2018](#)).

Ten student associations have been set up with the Faculty: Croatian Student Association of Faculties of Mechanical Engineering, Association of Students of Industrial Engineering and Management, Faculty Association of Students, Croatian Association of Students of Naval Architecture, Croatian Association of Students of Aeronautical Engineering, Association of Innovators of the Faculty of Mechanical Engineering and Naval Architecture, Student Association I3, Student Sports Association OMEGA, Association of Students of Mechatronics, and Association of Students of Materials Engineering. The Faculty supports the activities and projects of the associations by providing expert advice, facilities and financial support. The Faculty also supports numerous student projects (Formula Student, unmanned aircraft, waterbike, student magazine I3, etc.), in which students take the opportunity to show their creativity, innovativeness and to broaden their knowledge and develop skills in actual projects. In such projects students have an opportunity to apply the knowledge they have acquired during their studies and gain experience of teamworking. Most student

associations participate in international events, projects, conferences, seminars, competitions and workshops, and they have been presented with numerous awards and recognition.

The Committee on Promotion of Faculty-Industry Collaboration ([Resolution, Dean's body no. 8, page 10](#)) works permanently on strengthening connections with industry and promoting the Faculty. The Committee also encourages the researchers to propose projects in collaboration with industry funded by EU structural funds. With the aim of intensifying the collaboration with industry the Faculty Council set up the Economy Council as an advisory body to the Dean at its 2nd regular meeting in the academic year 2015-2016. The Economy Council comprises 18 members coming from industry and four Faculty staff members. The founding of the Economy Council led to improved collaboration with industry in different areas: development and high technology projects, debate about the learning outcomes, student training programmes, student scholarships and awards, etc. The staff of the Faculty together with representatives from industry collaborate with other constituents of the University of Zagreb on the establishment of centres of excellence, centres of competence and technology parks.

The Faculty also hosts the alumni association [AMAC FSB](#), which promotes the Faculty, provides information on events taking place at the Faculty, establishes contacts and collaboration between former and current students and the staff of the Faculty, builds up the collaboration between the Faculty and similar education, development and research institutions in Croatia and abroad, promotes the engineering profession and establishes and develops the collaboration with similar associations. The association provides information to the teaching staff based on individual experience gained through engineering practice, collects information on the organization and activities of the Faculty, organizes meetings of the members, provides information to prospective students in relation to study programmes, gives information on activities of the University of Zagreb and other Croatian universities, university associations and the AMAC (Almae Matris Alumni Croaticae)/AMCA association in Croatia and abroad.

In addition, there are numerous professional societies or associations that organize lectures and events at the Faculty and outside the Faculty, when former students of the Faculty gather. On such occasions information on the activities of the Faculty are exchanged. Presidents of these associations are mostly teachers of the Faculty.

The Faculty has quality policy and accompanying procedures for assurance of quality and standards of its programmes and qualifications. To permanently improve quality the Faculty has adopted several strategies, policies and procedures in which students and other stakeholders are included and that are made available to public. The Strategy Committee, comprising ten members, is responsible for proposal and implementation of the Faculty strategy. With the aim of accomplishing its mission and vision, the Faculty has defined eleven general strategic goals in its Strategy 2014-2025. The document was adopted by the Faculty Council at the meeting held on 26 November 2013 (Class: 602-04/14-1/6, File No: 251-66-1700-14-1). In addition to the vision and the mission, general and specific goals for the three areas of the Strategy of the Faculty (2014-2025) have been adopted, and the fourth area [Management and Organization Strategy](#) was adopted at the meeting held on 15 April 2014; the document is available on line. The staff of the Faculty has awareness that quality needs to be monitored and improved continuously, which is supported by numerous good practice examples that are included in the Quality Assurance Manual.

The quality assurance policy reflects the relationship between research and professional work and learning and teaching. By entering into inter-institutional agreements on collaboration the Faculty encourages the establishment of collaboration with partners from industry and international scientific community, between those interested in collaboration in research and development, i.e. application of Croatian and international research projects, which would result in new scientific value and education of experts that are capable of pursuing lifelong learning actively and successfully. Having an important role in the STEM area, the Faculty is continuously working on setting up mechanisms for exchange of knowledge with industry. In joint research directed to satisfying the needs of industry engineers working in industry improve their competencies, while researchers from the Faculty broaden their professional knowledge. The aim is to enable undergraduate,

graduate and postgraduate students to broaden their experience during their studies by increasing their interacting with industry while working on student projects, undergoing student training in companies, doing field work, and writing undergraduate, graduate and doctoral theses.

The Faculty has established Centre for Technology Transfer, Ltd. (CTT), whose main activity is to transfer knowledge from the Faculty to industry. The strategic goal of CTT is to develop and strengthen the innovative role of the Faculty in achieving sustainable development.

The definition of strategy and strategic goals is based on the SWOT analysis as follows:

<p>Strengths</p> <p>↳ Goals easy to achieve:</p> <ul style="list-style-type: none"> ▪ long tradition in engineering education ▪ quality of engineers graduated from the Faculty has been proven in practice ▪ high employability of the graduates ▪ human resources, teaching and research staff ▪ infrastructure and well equipped laboratories (accredited laboratories) ▪ well-equipped and organized Library ▪ facilities well equipped with computers ▪ all information available online at www.fsb.unizg.hr ▪ considerable amount of teaching materials available online at e-Learning ▪ a high level of living standard of students (canteen, associations) ▪ organized sports and cultural activities for students 	<p>Weaknesses</p> <p>↳ Goals difficult to achieve:</p> <ul style="list-style-type: none"> ▪ difficulties due to the study programme duration 3.5 years (undergraduate study) + 1.5 years (graduate study). Most higher education institutions have study programmes that last 3 years + 2 years ▪ still insufficient number of hours devoted in the study programmes to practical work of students ▪ the curricula of some courses still do not correspond with the proclaimed student workload ▪ not all facilities have been equally equipped with instruments and other equipment ▪ still insufficient number of students interested in international mobility
<p>Opportunities</p> <ul style="list-style-type: none"> ▪ high employability of engineers to stimulate the interest of students ▪ growing interest in gifted high school students to study mechanical engineering ▪ improvements in the study programme duration ▪ applying for funding from EU funds for development to equip laboratories ▪ applying for international projects in various EU programmes ▪ further development of collaboration with industry ▪ further strengthening of activities of alumni through AMAC FSB ▪ improvements in the lifelong learning system ▪ further increase in the number of courses taught in English to attract foreign students ▪ permanent improvements in the quality assurance system ▪ encouraging student mobility ▪ increasing the capacities for activities of student associations 	<p>Threats</p> <ul style="list-style-type: none"> ▪ gifted high school students leave Croatia to study abroad ▪ reduced funding from the government budget ▪ uncertainty associated with frequent changes in the higher education system ▪ best graduate and postgraduate students (potential researchers and teachers) leave Croatia

In line with the strategic goals and the SWOT analysis the [Short-term Action Plan](#) was adopted by the Faculty Council at its meeting held on 21 April 2015, in which activities, responsibilities, indicators and mechanisms for monitoring the implementation of the strategic documents are specified.

The Faculty Board supported by all bodies of the Dean and the Faculty Council collects and analyses the data on processes and resources in a continuous and systematic manner and uses the data to effectively manage and improve its activities as well as for further development of the Faculty. For the effective management of the Faculty the meetings of the Enlarged Council of Deans are of greatest importance: these meetings are attended by heads of the departments and independent chairs, and if required, heads of all chairs. As a rule, the meetings take place on a monthly basis a week prior to the meeting of the Faculty Council. The items on the agenda are related to the topics and materials that will be discussed in the Faculty Council meeting. Upon discussion and reaching conclusions, the heads of the departments and chairs inform members of their departments and chairs and other members of the Faculty Council about the conclusions. Meetings are also regularly held between the Faculty Board and administrative and other staff of the Faculty. Currently, the issue of digitalization of the activities including the implementation of the business and information system Infomare and the software Infor EAM to support the processes of maintenance and management of facilities is being discussed.

To support the quality assurance system and improve the efficiency of communication between the Faculty Board, departments, chairs, offices and bodies of the Faculty, the [Intranet application in the Atlantis system](#) is used. The application, launched on 30 March 2015, allows the users to keep and retrieve the minutes of the meetings of the departments, chairs, committees, boards and other offices. The application allows insight into the activities of the above mentioned organizational units. All employees of the Faculty may use the application. Heads of the offices, chairs of the committees and boards, heads of the departments, chairs and independent chairs as well as the Faculty Board are responsible for entering the information. The minutes of the bodies of the Dean and the Faculty Council are made available to all employees, while the minutes of department and chair meetings are made available to members of the respective department and chair. The Faculty Board has access to all the minutes, so they receive feedback on the way resolutions made by the Enlarged Council of Deans and the Faculty Council are carried out by the departments and other organizational units. The use of the application to keep and retrieve the minutes resulted in better communication between the Faculty Board, departments, chairs, offices and bodies of the Faculty. At the end of each academic year the Intranet database containing the minutes is analysed. These implemented mechanisms significantly improve the process of managing the Faculty. Also, the Faculty Council's and Dean's committees and boards contribute greatly to accomplishing the mission and the goals of the Faculty, supporting the Faculty Board.

The Faculty is committed to the development and implementation of policies of human resources management in line with the professional principles and standards. The departments, chairs and laboratories carry out teaching, research and professional activities and take care of professional development of researchers, teachers and other professionals. The general professional, administrative and general affairs are carried out by the Secretariat including the following offices: Dean's Office, General Affairs Office, Student Affairs Office, Project Administration and Mobility Office, Procurement Office, Library, Computer Centre, Finance Department, and Investments, Maintenance and Security Office. The scope of activities of the chairs affiliated with departments and of the laboratories as well as of the non-teaching staff has been specified by the [Regulations on the Faculty organization and job classification](#), which were adopted by the Faculty Council on 16 May 2017, approved by the Senate of the University on 11 July 2017 and entered into force on 22 July 2017.

The Human Resources Committee, the Faculty Board and heads of the departments, chairs and other offices of the Faculty continuously carry out a wide variety of activities related to the area of human resources strategy. This issue is of utmost importance for the Faculty. The Human Resources Committee makes comprehensive analyses to systematically monitor and plan the needs for hiring teaching staff, as described in more detail in 4.2. In the last four years the share of non-teaching staff has been significantly reduced, and

the share of young researchers on projects and assistants hired due to the allocation of the so called development coefficients by the University of Zagreb has considerably increased. The Human Resources Committee updates its [website](#) where all corresponding documents needed for their meetings are made available, making the access to information transparent to all members of the Committee. Other employees of the Faculty have access to forms, guidelines, documents and the minutes of the meetings of the Committee in the Atlantis system.



The screenshot shows the ATLANTIS web management system interface. The top navigation bar includes 'Radna površina', 'Atlantis', and 'Zapisnici iz 2016./2017. ak.godine'. Below this, a breadcrumb trail shows 'Početna > 4000 Radna tijela De... > 4100 Povjerenstvo za kadrove'. A sub-menu is open for '4100 Povjerenstvo za kadrove', listing two items:

Item	Date	Status
a. Sastanci Povjerenstva za kadrove	Listopad 2016.	13/14
b. Potrebni dokumenti za izbor u znanstveno-nastavna, nastavna i suradnička zvanja i izbore na radna mjesta na FSB-u	Listopad 2017.	5/5

Below the list, there are two expandable sections:

- ▶ Sastanci Povjerenstva za kadrove
- ▶ Potrebni dokumenti za izbor u znanstveno-nastavna, nastavna i suradnička zvanja i izbore na radna mjesta na FSB-u

1.2. The higher education institution implements recommendations for quality improvement from previous evaluations.

The higher education institution analysed the recommendations for improvement and undertakes activities on the basis of previous internal and external evaluations.

The higher education institution analyses improvements and plans further development accordingly.

Under the Act on Quality Assurance in Science and Higher Education (Official Gazette no. 45/90) and the Ordinance on the Content of Licence and Conditions on Issuing Licence for Performing Higher Education Activity, Carrying out a Study Programme and Re-accreditation of Higher Education Institutions, in 2012 the Agency for Science and Higher Education carried out external evaluation of the Faculty according to *the Standards and Guidelines for Quality Assurance Systems in the European Higher Education area* (2005 version, seven standards of ESG). The Expert Panel prepared Final report including a detailed analysis of how requirements of the standards and the criteria for re-accreditation of university institutions are met. Recommendations for quality improvement were also given. The findings showed that the requirements of four out of seven standards were „substantially met“ and the requirements of three were „partially met“ (ESG 1.2 Study programmes; ESG 1.5 Scientific and professional activity; ESG 1.6 Mobility and international collaboration). The assessment ranged from 2 to 3 on the scale of 0 to 4.

Improvements have been carried out based on the recommendations. Research productivity of all departments has increased. Recently, the Faculty has increasingly engaged in international collaboration through European projects in particular, which is also a consequence of the accession of Croatia to the EU. In line with the recommendations of the Expert Panel numerous activities have been carried out as well as improvements in the quality assurance system with respect to all standards.

In line with the recommendations the [Quality Improvement Action Plan](#) was prepared and adopted by the Faculty Council at its meeting held in May 2013.

With respect to Goals 1 and 2 of Recommendation 1 (Faculty Management) of the [Action Plan](#) Economy Council was founded and the INFOMARE system was implemented in several stages.

The implementation and evaluation of Goals 3 to 7, Recommendation 2 (Study programmes) are described in more detail in Standard 2 hereof.

The implementation and evaluation of Goals 8 and 9, Recommendation 3 (Students) are described in more detail in Standard 3 hereof.

The implementation and evaluation of Goals 10 and 11, Recommendations 4 and 5, (Teaching staff and Research and professional activities) are described in more detail in Standards 4 and 5 hereof.

The implementation and evaluation of Goal 12, Recommendation 6 (International collaboration and mobility) are described in more detail in Standards 3 and 4 hereof.

The implementation and evaluation of Goal 13, Recommendation 7 (Resources) are described in more detail in Standards 3 and 5 hereof.

In 2014 the Agency for Science and Higher Education carried out a periodic external evaluation of quality assurance systems of the Faculty. Based on the Report of the Expert Panel on the results of the external evaluation, delivered in August 2014, a Co-ordination Task Force was set up to co-ordinate the planning and implementation as well as monitoring and evaluation of the activities as specified in corresponding standards of ESG. In co-operation with the bodies of the Faculty Council and the Dean, the departments, chairs and other offices of the Faculty the Co-ordination Task Force prepared a Report on implemented activities, which was adopted by the Faculty Council at its meeting held on 21 April 2015. For the purpose of monitoring the planned activities in the follow-up period the Co-ordination Task Force and the Faculty's Computer Centre developed an application „Quality Assurance System Action Plan“, which was used for monitoring and keeping records in a more effective manner during the implementation of the planned activities. The Co-

ordination Task Force used the same application to monitor the implementation timeline and to carry out the final evaluation and reporting. The implementation of the remaining permanent activities and completion of particular activities to their full implementation is a continuous process and is accompanied by corresponding records even upon completion of the follow-up period. All employees of the Faculty have their accounts and are granted access to the application and the activity-related entries in the Atlantis system. A digital record of the Report has also been created, which includes active links to all attachments and relevant documents as well as evidence of activity completion. The documents are made available in the Atlantis system (Faculty Intranet) to the members of the External Evaluation Expert Panel of the Agency for Science and Higher Education as they were provided with user accounts. The Atlantis module „Project Monitoring“ and the „QAS Action Plan“ application are regularly maintained and upgraded by adding new functions and they are continuously used as required by the quality assurance system of the Faculty.

At its 7th regular meeting held on 26 April 2016 the Faculty Council adopted the [Self-evaluation report of the new postgraduate doctoral study programme](#). An Expert Panel visited the Faculty in May 2016 to perform assessment for re-accreditation of the doctoral studies. The report of the Expert Panel, an integral part of the Accreditation Recommendations, recommended improvements that to the most part referred to the old doctoral study programme, which the Faculty explained in its reply to the recommendations. Upon completion of the re-accreditation of the new doctoral study programme on 20 March 2017, the State Secretary issued a certificate that confirms that the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, has met the requirements for performing activities related to the postgraduate university study programmes in Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgy.

1.3 The higher education institution supports academic integrity and freedom, prevents all types of unethical behaviour, intolerance and discrimination.

The higher education institution supports academic integrity and freedom, upholds the ethical standards and preserves academic integrity and freedom.

The higher education effectively uses mechanisms for preventing unethical behaviour, intolerance and discrimination.

The higher education institution carries out activities related to the sanctioning of unethical behaviour, intolerance and discrimination.

The system for managing conflicts and resolving irregularities is functional at all levels of the higher education institution.

The work of employees of the higher education institution, its students and external stakeholders, is based on ethical standards in higher education.

The higher education institution systematically addresses issues of academic dishonesty (plagiarism, cheating, etc.).

Fundamental values and means of overseeing ethical behaviour are specified by the Code of Ethics of the University of Zagreb, which is also applied by the Faculty. The University Code of Ethics contains ethical principles and standards of professional conduct, which teachers, researchers, artists and other employees of the University of Zagreb are obliged to follow. The Code includes the following:

Ethics principles of moral conduct:

- the principle of peaceful exercise of the rights
- the principle of respect of the integrity and dignity of others
- the principle of autonomy in research and teaching
- the principle of equality and justice
- the right to academic freedom
- the principle of professionalism
- obligation to obey the law and legal proceedings

Ethical rules apply to the following:

- discrimination
- harassment
- prejudice
- professional obligations in teaching
- unacceptable practices in teaching
- use of humans and animals in research and artistic work
- fabricating findings
- forgery
- plagiarism
- fabrication and falsification of references / letters of recommendations
- accepting gifts and other goods
- conflict of interest
- transparency and confidentiality
- right and obligation to continuous improvement and lifelong learning
- professional development

- public appearance
- responsibility toward academic community

The Faculty Ethics Committee ([Resolution, Dean's body no. 5, page 9](#)), a special Dean's committee adopted by the Faculty Council, is responsible for overseeing the upholding of the University Code of Ethics. The Ethics Committee comprises three members who are teachers and two student representatives. The Ethics Committee meets as appropriate, either when they have become aware of or have received information about a case of unethical behaviour. The issues of ethics are also included in the following regulations of the Faculty:

- Student Disciplinary Regulations
- Staff Disciplinary Regulations
- Labour Regulations
- Health and Safety at Work Regulations
- Confidentiality Regulations

Results of student satisfaction surveys in which students have an opportunity to report unacceptable behaviour are also analysed. The Quality Assurance Committee, the Vice dean for education and the Dean have the authority to read all student satisfaction surveys, and if applicable, they inform the Ethics Committee or the Staff Disciplinary Committee or the student if a problem occurs.

The Faculty deals with problems of plagiarism, cheating and fabrication of findings systematically. The Board of Postgraduate Studies deals with ethics in research, paying close attention to possible unethical behaviour when doctoral theses are approved. In the last three years, the Ethics Committee, the Faculty Board and the Faculty Council have processed cases of cheating in exams and plagiarism in a doctoral thesis.

The Faculty's Student Disciplinary Committee, a committee of the Faculty Council, comprises five members and carries out student disciplinary procedures. Further, the Faculty's Staff Disciplinary Committee, a Dean's committee, comprises three members and three substitute members and carries out staff disciplinary procedures. Currently, one representative of the Faculty is a member of the University Ethics Committee.

The Faculty applies international labour standards to the process of employing the best research staff. All competitions for assistants and young researchers are announced internationally, published on the EURAXESS portal in English in line with the European Charter for Researchers.

1.4. The higher education institution ensures the availability of information on important aspects of its activities (teaching, scientific/artistic and social).

Information on study programmes and other activities of the higher education institution is publicly available in Croatian and at least one world language.

The higher education institution informs stakeholders on the admission criteria, enrolment quotas, study programmes, learning outcomes and qualifications, forms of support available to students.

The higher education institution informs stakeholders on scientific/artistic and/or professional topics, projects and results, and the transfer of knowledge and technology.

Information on the social role of the higher education institution is made available to stakeholders.

The higher education institution informs stakeholders about other indicators (e.g. pass rate analyses, graduate employment, drop-out rates, outcomes of previous evaluations, etc.).

The Faculty uses its websites to provide students and other stakeholders with the latest and detailed information about all activities of the institution and other activities that take place. Information on study programmes and other information are made available to prospective students in different ways:

- the University of Zagreb Festival (for several consecutive years the Faculty has won the Best Booth Award and a prize for original presentation and communication),
- websites of the Faculty,
- Facebook page "[Svi na FSB](#)",
- Open Days and the Career Day organized simultaneously in the week in which the Faculty Day is celebrated in the main hall of the Faculty, in which also numerous employers participate,
- visits of the staff of the Faculty to high schools,
- the INOVA-MLADI exhibition – the exhibition of young innovators coming from primary schools and high schools, which has been taking place at the Faculty since 2005,
- staff of the Student Affairs Office and the Vice dean for education will provide information on the phone or send per e-mail.

The information in Croatian and English about the study programmes the Faculty offers, learning outcomes of these programmes, qualifications that can be acquired, competencies, duration of the studies, possibilities of further education and employment, student activities, projects and student associations, teaching and assessment methods that are used and other information (e.g. requirements to be met to be admitted in the first year of study, requirements for enrolling in 2nd, 3rd, 4th and 5th year of study, doctoral thesis defence, QAS documents, etc.) is made available on the website of the Faculty for the [undergraduate and graduate studies](#) and the website of the [doctoral studies](#). Such information is useful not only to prospective and current students but also to former students and other stakeholders and public in general.

Documents and information related to the QAS (analyses, reports, examples of good practice, indicators) are also grouped on the websites of the Faculty in two ways:

- made available to all stakeholders at https://www.fsb.unizg.hr/?sustav_osiguravanja_kvalitete,
- available internally to all users of the Atlantis system (repository of working documents and the minutes of meetings of the committees).

Information is posted on the official website of the Faculty, www.fsb.hr, under the [procedure](#) which was adopted by the Enlarged Council of Deans on 16 February 2015. Information is published in line with the guidelines arising from the [Freedom of Information Act](#). In addition, fundamental legal documents, list of projects with partners from industry at the regional and national level, international collaboration with other institutions, information on workshops on projects and findings and transfer of knowledge and technologies, summer schools, conferences, seminars, lectures, etc. are also available on the websites. On the Intranet

sites additional information and documents are available; these sites are the point of access to various systems and applications developed for the Faculty employees.

Information that is to be made available under the Freedom of Information Act is available online ([Katalog informacija](#)).

The Faculty continuously develops its system of self-promotion to highlight its presence in the society as one of highly important constituents of the University in the STEM area. The Faculty has been recognized as a trade name due to its tradition and positive public perception. Information about the social role of the Faculty is made available to the interested public on the websites of the Faculty. In this way, the results of the Faculty's activities are presented and the Faculty is integrated into the life of the society. The Faculty works continuously on its positioning in the society with the aim of promoting the values it stands for as effectively as possible, because these values are highly important for the society. On the other hand, by including stakeholders into everyday activities of particular bodies (the existing ones and the newly founded ones) the Faculty allows the flow of ideas from the society to the Faculty so that the Faculty can serve the broader interests of the society. The Faculty is aware of its role in the segments of society that are of utmost importance for security and defence of the country. Namely, in Croatia no other faculty covers such a wide field of engineering, and many engineering disciplines the Faculty is engaged in are fundamental in the development of a large number of technologies in the area of security and defence, resulting in a more prominent role the Faculty serves in this sector.

Monitoring of student development and success in particular courses is clearly specified in the curricula of these courses. Analyses of student success and pass rates are carried out at the end of each academic year, and the findings are presented to teachers and student representatives at the meetings of the Faculty Council. The correlation between the ECTS credits obtained by the first year students and their school leaving examination (Matura exam) grades as well as the pass rates for each course of study, specialisation and particular courses are analysed. The Faculty Board finds such analyses very useful for the process of developing new study programmes.

Analyses and evaluations of student participation in research and professional activities and their extracurricular activities closely related to the engineering profession can also be seen as aspects of monitoring the progress and success of the students. The Faculty fully supports student associations that are active at the Faculty as well as student projects. The results of the completed projects and results achieved in student competitions are regularly made public on the websites of the Faculty, which practice has also been positively assessed by the students because they believe that such achievements are also indicators of their academic progress.

Teachers, mostly undergraduate and graduate thesis advisors, keep direct contact with their former students. Also, the professional associations hosted by the Faculty organize lectures and seminars either on the premises of the Faculty or at some other venue and in such a way maintain contact with former students. The most active association in this respect is the Association of former students of the Faculty, AMAC FSB. At gatherings, information on employment of former students and their careers is regularly exchanged. In addition, various seminars and round tables gathering engineering professionals are organized at the Faculty. Meetings of the Faculty Board and the Economy Council are also to be noted here, at which employment of young engineers who graduated from the Faculty and their achievements during study are analysed.

1.5. The higher education institution understands and encourages the development of its social role.

The higher education institution contributes to the development of economy (economic and technological mission of the university).

The higher education institution contributes to the development of the local community.

The higher education institution contributes to the foundations of the academic profession and the accountability of teachers for the development of the university and the local community.

The development of its social role is a part of higher education institution's mission (e.g. development of civil society, democracy, etc.).

The Faculty is open to various forms of collaboration with industry: development projects, education of PhD students and postgraduate specialists who work on projects financed by companies, lifelong learning (seminars, workshops, lectures), preparation of expert studies, reports or opinions, carrying out measurement, calibration, and certification, etc. Students who undergo student training and make visits to successful companies also strengthen the connection between the Faculty and industry.

One of the main goals of the research activities of the Faculty is to increase research, development and innovation capacities and to move in new directions of high quality research that can meet the requirements of the industry. Such an approach has a positive effect on newly employed young researchers. This also enables the researchers to develop their market-oriented competencies and consequently, their successful transfer to and integration into the industrial sector. In such a way, awareness, interest, and research, development and innovation capacities of companies are enhanced as well as their potential for collaboration with scientific institutions in Croatia. In addition, one of the goals of the Faculty is to employ doctoral students and engineers with a PhD degree in Centre for Technology Transfer (CTT), because they increasingly leave Croatia upon termination of their employment contracts. Everything mentioned contributes to the increase in research, development and innovation capacities and the distinctivity of the Faculty, as well as to increased synergy with partners from industry and the academic community, which in turn facilitates participation in international projects.

The Faculty contributes to the economic development by undertaking activities co-ordinated by the Committee on Promotion of Faculty-Industry Collaboration ([Resolution, Dean's body no. 8, page 10](#)), which is a Dean's committee comprising ten members. The Committee analyses the economy and the situation in industry and makes proposals for new seminars to be organized, encourages collaboration between departments and other faculties and companies, and proposes measures to be taken to enhance collaboration. In addition, the Committee co-ordinates collaboration with CTT and other legal entities founded or co-founded by the Faculty. CTT was founded in 1996 with the permission of the Ministry of Science and Technology, and its primary objective is to improve industry-oriented research in an interdisciplinary manner and to give support in revitalizing industry segments related to the fields of mechanical engineering, naval architecture, aeronautical engineering.

Researchers of the Faculty contribute substantially to the development of Croatian and European economy by participating in development projects and solving complex problems, by providing consultancy and monitoring services, etc. The teachers also develop software packages that are used in science and industry (e.g. OpenFOAM software for computer simulations in computational fluid dynamics (CFD), Maestro software for conceptual design, Gasnet and Liqnet software programs for the analysis of liquid and gas flows in complex pipe networks, etc.). Some of the Faculty's teachers are also certified expert witnesses, whose expert reports are accepted in court as an expert opinion. There are six accredited standard and calibration laboratories at the Faculty, some of them are holders of national standards, e.g. of temperature, pressure and humidity determination (Process Measurement Laboratory), force and hardness (Mechanical Testing Laboratory), length and surface roughness (Precision Length Measurement Laboratory). In these laboratories

instruments for measuring length, surface roughness, angle, temperature, humidity, pressure, force, momentum, hardness, impact toughness and elongation are calibrated.

The following laboratories are also important: the Applied Thermodynamics Laboratory provides services of testing space heaters, fireplaces and stoves, testing ventilation, air-conditioning and microclimate systems, and the Machine Element Laboratory provides services of calibrating instruments for measuring momentum. In co-operation with the Croatian Welding Society the Welding Laboratory is engaged in training engineers and technicians in the field of welding according to the programme of the European Welding Federation (FSB-ZK Cert). The issued certificates are recognized internationally. The IC Engine and Motor Vehicle Laboratory is engaged in automotive homologation. The Croatian Energy Company (HEP-Toplinarstvo) and the Faculty jointly set up a Thermal Energy Laboratory located on the Faculty premises; the Laboratory provides services of calibration of heat meters used in central heating systems.

Technological projects and professional projects called for by companies have a direct influence on the economy. An example of such projects are centres of competence within a current competition prepared by the Ministry of Economy. The Faculty as a partner has announced a number of centres of competence as well as research, development and innovation projects in which an intensive collaboration with industry, in the thematic priority areas S3, energy and transport in particular, is expected.



Study programmes

2.1. The general objectives of all study programmes are in line with the mission and strategic goals of the higher education institution and the needs of the society

There is evidence that general goals of all study programmes are in line with the mission and strategic goals of the higher education institution.

The justification for delivering study programmes is provided and includes analysis of resources of the higher education institution required for delivering study programmes.

If the higher education institution delivers study programmes leading to degrees in regulated professions, it accepts the recommendations of professional organisations that govern their licencing.

The higher education institution produces competitive professionals for national and international labour markets.

General goals of all study programmes are in line with the needs of society (e.g. justification for delivering study programmes at the University, delivering similar studies at the Faculty and University)

Strategy objectives of the Faculty are defined in the document [Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture University of Zagreb \(2014 – 2025\)](#).

Educational Strategy of the Faculty is described in:

General objective 4: **Continuously review and update the curricula** with the emphasis on Specific objectives:

- 4.1. Provide a variety of study programmes in the fields of mechanical engineering, naval architecture and aeronautical engineering, in accordance with the social and industrial/economical needs. These programmes should be based on learning outcomes
- 4.2. Increase the proportion of laboratory and practical work as well as student industrial training in the curriculum
- 4.3. Continuously monitor and bring the actual requirements into line with the ECTS points assigned to particular courses and modules of the curricula
- 4.4. Bring the enrolment criteria into line with the required initial competences at each study level
- 4.5. Encourage and award student extracurricular activities which contribute to the reputation of the University, the Faculty and academic society, and which improve the individual knowledge as well as the knowledge of the society
- 4.6. Continuously monitor the study indicators with a view to increasing efficiency and success
- 4.7. Develop and complement educational programmes according to the results of the most recent scientific research and new methodological insights
- 4.8. Establish joint educational programmes in collaboration with prominent institutions
- 4.9. Develop and provide diverse modes of life-long learning

General objective 5: **Continuously improve educational methods and technologies** with the emphasis on Specific objectives:

- 5.1. Provide the stimulating and creative environment for learning and teaching, and substitute the traditional teaching forms with proactive teaching/learning
- 5.2. Stimulate the responsible approach to studying, to the acquisition of new knowledge and competences as well as to new insights on all study levels
- 5.3. Learning and teaching activities should be based on the problem solving approach in the interdisciplinary context of the profession. Through mentoring stimulate students to critical thinking

and problem analysis approach, teamwork, creativity, innovation, entrepreneurship and professional ethics

- 5.4. Apply the contemporary educational methods and information and communications technologies (continuing development of e-learning)
- 5.5. Develop and promote the evaluation of acquired competences with regard to the expected learning outcomes
- 5.6. Encourage the mobility of students and teachers at international level
- 5.7. Establish mechanisms for the improvement and evaluation of teaching competences
- 5.8. Encourage and reward teaching and academic achievements among students and teaching staff

Objectives of the study programmes are available on:

- <https://www.fsb.unizg.hr/atlantis/upisi/noviprogram/Nastavni%20program%20-L-Web.pdf>

The justification for delivering study programmes is reviewed every academic year when accepting enrolment quotas for undergraduate study, checking spatial and teaching capacity of the Faculty and the number of unemployed BEng and MEng who finished their study programmes at the Faculty (the analysis was obtained from Croatian Employment Service). Examples for academic year 2015/2016 (agenda items 2.1. and 2.2. of the Faculty Council session held on 16 February 2016) are available on:

- https://www.fsb.unizg.hr/sjednice_pregled.php?id_sjednice=11&list=zapisnik
- https://www.fsb.unizg.hr/atlantis/upload/agenda/fsbonline/578/11/343/Upisne_kvote-preddiplomski_studij_FSB-a.pdf

and for academic year 2016/2017 (agenda item 4.2. of the Faculty Council session held on 24 January 2017)

- https://www.fsb.unizg.hr/atlantis/wms/?list=dnevni_red&pg=dnevni_red&id_sjednice=47

Academic titles awarded after completing a certain level of study programme are described in [Pravilniku o sveučilišnom preddiplomskom i diplomskom studiju](#) (Article 51.).

The Faculty has actively participated in the implementation of ME4Catalogue project which has united four faculties in the Republic of Croatia all of which provide educational programmes in the fields of mechanical engineering. They compared learning outcomes of all the studies and defined mutual learning outcomes.

In order to get insight into desirable competences among BEng and MEng on the territory of the Republic of Croatia, the survey among businessmen during the implementation of the project was conducted. The analysis is available on:

- <http://me4catalogue.sfsb.hr/Data/Dokumenti/Konferencija/Hrvatski%20katalog%20znanjaFINAL.pdf>

The Faculty also delivers different modes of life-long learning that are of interest to the participants from industry (the interests of participants are continuously being followed via conducted surveys). Refreshing the content of the existing courses and designing new elective courses on the undergraduate and especially at the graduate level is directly related to the interests shown by the industry through the attendance of the seminar. The examples of seminars organised by the Centre for Technology Transfer are available on:

- https://www.fsb.unizg.hr/ctt/sem_odr_01.html

The examples that illustrate aforementioned interaction between study programmes and industry are organized seminars with the following topics:

1. The *Application of Infrared Thermography*, www.fsb.unizg.hr/ctt/seminari_2015/150202_izobr_termografista.pdf and new elective course 'Quantitative Infrared Thermography' implemented in the study programme at the Faculty Council session held on 11 May 2010: <https://www.fsb.unizg.hr/atlantis/wms/index.php?cat=433&pregzap=yes&sif=251-66-1700-10-6> description of the course is available on: https://www.fsb.unizg.hr/atlantis/wms/moduli/baza_kolegija/ispis_kolegiji.php?kolegij_id=603

2. *ENCERT*: <https://www.fsb.unizg.hr/encert/index-pocetna.html>
and new elective course adopted at the Faculty Council session held on 16 June 2015
<https://www.fsb.unizg.hr/atlantis/wms/index.php?cat=433&pregzap=yes&sif=251-66-1700-15-7>
 - a) *Building Energy Certification*,
[15 Energetsko certificiranje zgrada OBRAZAC 7](#)
 - b) *Energy efficiency and optimisation of buildings*,
[19 Energetska učinkovitost i optimizacija u zgradama OBRAZAC 7](#)
 - c) *Energy inspection of buildings and plants*,
[20 Energetski pregled zgrada i industrijskih postrojenja OBRAZAC 7](#)

2.2. The intended learning outcomes at the level of study programmes delivered by the higher education institution are aligned with the level and profile of qualifications gained.

The higher education institution has clearly defined the learning outcomes of the study programmes, and they are aligned with the mission and goals of the higher education institution.

The higher education institution has effective mechanisms for assessing and ensuring that the learning outcomes at the level of courses are aligned with the learning outcomes at the programme level, without necessary repetition and overlapping.

Learning outcomes achieved in the study programme are aligned with the CroQF and EYF level descriptors.

In defining learning outcomes, the higher education institution acts in line with professional requirements and internationally recognizes professional standards, ensuring that the programme is up to date.

The intended learning programme outcomes clearly reflect the competencies required for employment, continuing education or other individual/society needs.

Learning outcomes of all study programmes are available on Atlantis and are aligned with the learning outcomes at the programme level in the following manner:

- I. level: general outcomes for undergraduate/graduate study
- II. level: learning outcomes of the study programme at the undergraduate or graduate level
- III. level: specific learning outcomes of a course

All information regarding all study programs at undergraduate and graduate levels of the Faculty are available on: https://www.fsb.unizg.hr/?lista_kolegija

According to the aforementioned, learning outcomes at the level of courses are clearly defined as well as their contribution to the realisation of the learning outcomes at the programme level.

During the elaboration of the structure of all study programs, the contributions of each course to the learning outcomes of study programmes were analysed, and the direct dependence of the subjects forming the study program and the learning outcomes of the study program was obtained.

Learning outcomes achieved in the study programme are updated annually (when adopting curricula for the following academic year, the Faculty Council session in June), and consequently are aligned with the CroQF and EYF level descriptors.

Thereby, all teachers are sent appropriate documentation and are invited to update the data on the subject (e.g. presentation from teachers education with learning outcome topics, tables with Bloom taxonomy and alike).

Examples of communication from April 2016:

- [Dopis nastavnicima travanj 2016 final dopuna ib](#)
- [Odgovori na cesto postavljena pitanja - objedinjeno](#)
- [OBRAZAC3](#)
- [OBRAZAC7](#)
- [Kolegiji na engleskom u 2015 2016](#)

or March 2017:

- [Dopis nastavnicima Dukic 2017](#)
- [Ishodi učenja Upute FSB](#)

- <https://www.fsb.unizg.hr/atlantis/upload/projects/fsbonline/565/555/Skupovi%20ishoda%20ucenja%20za%20D%20strojarstva%20FSB.pdf>
- <https://www.fsb.unizg.hr/atlantis/upload/projects/fsbonline/565/555/Skupovi%20ishoda%20ucenja%20za%20PD%20strojarstva%20FSB.pdf>

The results of the alignment of learning outcomes with the CroQF and EYF level descriptors can also be seen when adopting curricula for the following academic year.

Example:

- The Faculty Council session held on 21 June 2016 (points 3.2 and 3.3)
https://www.fsb.unizg.hr/sjednice_pregled.php?id_sjednice=15&list=zapisnik
- The Faculty Council session held on 20 June 2017 (points 4.1 and 4.2)
https://www.fsb.unizg.hr/sjednice_pregled.php?id_sjednice=52&list=zapisnik

All changes to the study programmes adopted by the Faculty Council are sent for approval to the University Quality Assurance Committee, after which the changes will be implemented in the curricula.

All main documents for the study are available to students on: <https://www.fsb.unizg.hr/?stuslu>, such as:

- [Pravilnik o preddiplomskom i diplomskom studiju FSB-a](#),

Curricula for every academic year (e.g. for academic year 2016/2017 for undergraduate study)

- https://www.fsb.unizg.hr/atlantis/web/sites/fsbonline/content/362/71/lzvedbeni%20plan-preddiplomski%20-%202016-17_v2.pdf

and the detailed list of all courses:

- https://www.fsb.unizg.hr/?opisi_kolegija

The Faculty has actively participated in the implementation of ME4Catalogue project, me4catalogue.sfsb.hr, and in cooperation with four Croatian undergraduate and graduate universities in the field of mechanical engineering, has defined learning outcomes for undergraduate and graduate university mechanical engineering studies, document available on

- <http://me4catalogue.sfsb.hr/Data/Dokumenti/Konferencija/Hrvatski%20katalog%20znanjaFINAL.pdf>.

The evidence that learning outcomes of the study programmes clearly reflect the competencies required for employment is provided in the statistics on the employment of BEng and MEng that is available from the Croatian Employment Service, e.g. [HZZ statistika 2016](#), which confirms the connection between the Faculty and the industry and compliance with the labour market requirements.

2.3. The higher education institution provides evidence of the achievement of intended learning outcomes of the study programmes it delivers.

The higher education institution ensures the achievement of intended learning outcomes of the study programmes it delivers.

The higher education institution continually revises and improves the teaching process on the basis of evidence on the achievement of the intended learning outcomes (e.g. test, seminar papers, presentations etc.)

Learning outcomes achieved by students are in line with the needs of the profession.

Learning outcomes achieved at the end of study programmes are in line with the labour market requirements and social needs.

When implementing new courses, the course coordinator provides evidence on the justification for designing new course (new content should not appear in other courses, and it should be relevant to the profession and students' interests).

Learning outcomes of a new course should be aligned with the level of the study programme and with the learning outcomes at the programme level in general.

Curriculum Committee adopts the changes in the curriculum and the implementation of new courses, after which the Faculty Council confirms the approval. The implementation of new courses in the study programme (according to the University instructions) is conducted on two year level, while minor changes of the study programme are run annually. According to the detailed instructions issued by the University, the activities that fall into certain categories of changes are defined.

The example of minor changes of the study programme for academic year 2017/2018 is available on the link of Curriculum Committee session held on 24 May 2017:

- <https://www.fsb.unizg.hr/atlantis/wms/index.php>

as well as suggestions of all changes of the study programme that were suggested by the Departments. The suggestions are delivered at the Faculty Council session held on 20 June 2017 agenda item 4.1. and 4.2.

- https://www.fsb.unizg.hr/sjednice_pregled.php?id_sjednice=52&list=zapisnik

The synthesis of the learning outcomes is closely audited during writing and defending graduate thesis in the course Project. The course is delivered in the first or the second semester of graduate study where the topic of the thesis must be from the field of specialization (when enrolling in graduate study, student selects the specialization).

The learning outcomes of the study programme are also audited during writing and defending undergraduate/graduate theses.

The list of undergraduate and graduate theses is available on:

- <http://repositorij.fsb.hr/view/doctype/thesis.html>

Undergraduate Examination Boards, appointed by the Faculty Council for a specified period, is responsible for the placement of undergraduate / graduate theses.

- https://www.fsb.unizg.hr/atlantis/upload/newsboard/03_01_2017_26115_07122016094439.pdf

The deadlines for writing and defending the undergraduate theses are carried out in terms agreed by the Faculty Council and published on the Faculty website https://www.fsb.unizg.hr/?diplomski_ispiti.

The procedure of defending undergraduate and graduate theses is conducted in the following manner:

1. Choosing undergraduate or graduate thesis advisor and undergraduate or graduate thesis topic
2. Accepting the advisor and possible topic by the Department

3. Assigning undergraduate or graduate thesis topic
4. Evaluation of undergraduate or graduate thesis topic by the Board
5. Completion of undergraduate or graduate thesis during a defined period of time with mandatory consultations with the advisor
6. Advisor's evaluation of submitted undergraduate or graduate thesis in front of the Board
7. Final oral defence of the undergraduate or graduate thesis in front of the Board which comprises the teacher from the field thesis was conducted

During oral defence all knowledge from the entire field of undergraduate / graduate thesis is examined together with the learning outcomes of the respective level of the study program.

[Repository of undergraduate theses](#) and [Repository of graduate theses](#) are available on the Faculty Library webpage.

2.4. The HEI uses feedback from students, employers, professional organisations and alumni in the procedures of planning, proposing and approving new programmes, and revising or closing the existing programmes

Development activities related to study programmes are carried out systematically and regularly, involving various stakeholders.

Planning and proposing new study programmes includes an analysis of justification for delivering a study programme, resources and alignment with the strategic goals at the local and regional level, and other needs of society.

The higher education institution provides evidence on the justification for delivering same or similar study programmes within the same university.

The higher education institution publishes up-to-date versions of study programmes.

The higher education institution records the changes to study programmes and analyses their fitness for purpose.

Based on regular analyses of study programmes, which include information obtained from external stakeholders

- <http://me4catalogue.sfsb.hr/Data/Dokumenti/Konferencija/Hrvatski%20katalog%20znanjaFINAL.pdf>

and based on the results from questionnaires conducted among students (individually e.g. [rujan 2014 preddiplomski](#) or [prosinac 2014 diplomski](#) or in whole [Ankete promoventi rezultati 2015-2016-2017](#)) and on the pass rate analysis (which is conducted every semester / annually and delivered in the Dean's annual report, e.g.

- https://www.fsb.unizg.hr/atlantis/upload/agenda/fsbonline/578/48/1312/Izvjesce_Dekana_za_ak_g_od_2015_2016.pdf),

the Faculty revises all study programmes. All suggestions from study programmes are also being compared with the study programmes of distinguished foreign universities.

The work by Curriculum Committee

- https://www.fsb.unizg.hr/atlantis/upload/newsboard/03_01_2017_26115_07122016094439.pdf

began with the analysis of the study programme structure (report from 14 February 2017), whereby thorough analysis was conducted regarding advantages and disadvantages of the study programme structure, available on:

- <https://www.fsb.unizg.hr/atlantis/wms/index.php>

which was further discussed at the Faculty Council session held on 21 March 2017, link:

- https://www.fsb.unizg.hr/atlantis/wms/?list=dnevni_red&pg=dnevni_red&id_sjednice=49

After the discussion, work on the development of new study programmes continued. The suggestions sent by some Departments, or specializations are available in the folder titled Suggestions of new study programmes on link:

- <https://www.fsb.unizg.hr/atlantis/wms/index.php>

The work of the Curriculum Committee is continuous; it includes students from different study levels and takes into consideration suggestions given by the Committee on Promotion of Faculty-Industry Collaboration.

Current study programmes are available on:

- https://www.fsb.unizg.hr/?opisi_kolegija,

together with courses that, depending on students' interest can be delivered in English.

All changes to study programs go through a standard procedure:

1. The Curriculum Committee, link Suggestion of minor changes of study programmes in academic year 2017/2018. <https://www.fsb.unizg.hr/atlantis/wms/index.php> ([Atlantis Povjerenstvo izmjene web 1](#)), example [1 Zavod za materijale Matijevic Landek izmjene 2017](#)
2. The Faculty Council, link https://www.fsb.unizg.hr/sjednice_pregled.php?id_sjednice=52&list=zapisnik
3. University Quality Assurance Committee, example [05 OBRAZAC7 FSB preddiplomski studij strojarstva](#) and then all changes are stored in the archives of the Faculty.

2.5. The higher education institution ensures that ECTS allocation is adequate.

The higher education institution allocates ECTS credits in accordance with the actual student workload, based on the analyses of feedback from stakeholders in the teaching process, or other procedures.

Students are provided with feedback on the results of the analysis of gathered information and the implemented changes.

Since the implementation of the Bologna process, the Faculty systematically monitors and ensures that ECTS allocation is adequate with the actual student workload. This particularly applies to basic courses on undergraduate studies.

Long-term survey has shown that there is a gap between defined ESCT credits and actual student workload on a certain number of courses in a way that some courses have been accredited with undervalued while others with overvalued credits. The problem was solved by implementing new contents and activities to the courses with 'overvalued' credits and for the courses that were 'undervalued', new study programmes were designed in order to redistribute the number of teaching hours and ECTS credits.

The introduction of new study programs has not yet been completed, the part related to the alignment of ECTS points and student workload from the student surveys is taken into account.

Surveys are conducted on all undergraduate and graduate study programmes. The examples of the analysis on the ECTS allocation and the actual student workload are available on:

- https://www.fsb.unizg.hr/atlantis/upload/projects/fsbonline/565/114/Primjer%20ankete_diplomski%20studij_1.pdf
- https://www.fsb.unizg.hr/atlantis/upload/projects/fsbonline/565/114/Primjer%20ankete_diplomski%20studij_2.pdf
- https://www.fsb.unizg.hr/atlantis/upload/projects/fsbonline/565/114/Primjer%20ankete_preddiplomski%20studij_dio%20I.pdf
- https://www.fsb.unizg.hr/atlantis/upload/projects/fsbonline/565/114/Primjer%20ankete_preddiplomski%20studij_dio%20II.pdf

Within annual review of existing study programmes all suggestions regarding reassignment of ECTS credits of some (mostly elective) courses is taken into consideration according to the request of the Chair coordinator. The example of reassigning ECTS credits is in the document sent to the University Quality Assurance Committee (changes refer to graduate study of the mechanical engineering):

- [Izmjene i dopune 2014. diplomski studij strojarstva.](#)

2.6. Student practice is an integral part of study programmes (where applicable).

The higher education institution allows for learning and obtaining new skills through student practice, where applicable.

Where applicable, student practice is an integral part of study programmes and is organised outside the higher education institution, in cooperation with the labour market.

Student practice is an integral part of all study programmes for both study levels.

During the study, the practice is organised through two courses: Industrial practice I (at the undergraduate level, 6th semester) and Industrial practice II (at the graduate level, 1st semester). The practice usually takes place during the summer, between the sixth and the seventh semester at the undergraduate level, or between the first and the second semester at the graduate level ([Pravilnik o preddiplomskom i diplomskom studiju](#)).

The practice usually lasts for, at least, 20 work days and is prescribed by the Statutes of the Faculty

- www.fsb.unizg.hr/atlantis/upload/newsboard/18_09_2017_27541_Statut_FSB_travanj_2017.pdf,

and recently by the adopted Regulations on Industrial practice.

ECTS credits assigned to Industrial practice I

- https://www.fsb.unizg.hr/atlantis/web/sites/fsbonline/content/362/71/Izvedbeni%20plan-preddiplomski%20-%202017-18_v2.pdf

and Industrial practice II

- https://www.fsb.unizg.hr/atlantis/web/sites/fsbonline/content/362/71/Izvedbeni%20plan-diplomski%20-%202017-18_v2.pdf

are not suitable regarding prescribed student workload. In other words, the required period of practice is $20 \times 8 =$ minimum of 160 working hours i.e. 160/30 minimum 6 ECTS credits. For this reason, the new study program envisages a different organization of student practice.

The head of professional practice / courses and the coordinator of professional practice were appointed to organise student practice (link:

- https://www.fsb.unizg.hr/atlantis/upload/newsboard/03_01_2017_26115_07122016094439.pdf.

All rules and regulations on conducting professional practice are available to students on:

- https://www.fsb.unizg.hr/?industrijska_praksa.

The procedure includes communication between students – head of professional practice / course and responsible person in the company where the practice takes place. All needed documentation is available to students on the webpage.

Since the Faculty does not have pre-contracted contracts with companies where the practice takes place, student proposes the company or addresses the head of practice.

New computer programme has been launched, in cooperation with students and Computer Centre, which enables simplified selection of companies and provides more information to both students and companies. Also, there is a possibility of interviewing / evaluating both employers and students who have finished the practice.

2.7. Lifelong learning programmes delivered by the higher education institution are aligned with the strategic goals and the mission of the higher education institution, and social needs.

There is evidence that general goals of the lifelong learning programmes are in line with the mission and strategic goals of the higher education institution.

There is evidence that general goals of the lifelong learning programmes are in line with social needs, needs of the labour market and individual needs.

Revision and development of lifelong learning programmes is carried out systematically and on a regular basis.

In the document [Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture University of Zagreb \(2014 – 2025\)](#), in the part which refers to Educational Strategy (General objective 4: *Continuously review and update the curricula*) life-long learning is included in item 4.9. *Develop and provide diverse modes of life-long learning.*

Life-long learning of the Faculty is realized through:

- Seminars
- Conferences
- Education
- Summer schools

Continuous training of participants is conducted on different topics of relevance to the industry at the Centre for Technology Transfer, which was founded by the Faculty, and at the Faculty.

List of seminars organized by the Faculty during 2016:

- [Popis seminara Fakultet 2016.](#)

List of seminars organized by the Centre for Technology Transfer is available on

- https://www.fsb.unizg.hr/ctt/sem_odr_01.html,

and the list of future seminars are available on the webpage of the Centre,

- https://www.fsb.unizg.hr/ctt/sem_plan.html.

During academic year 2016 and 2017 following trainings have been held: [Popis seminara CTT.](#)

Trainings are continuously being updated and adapted to new contents within the field. The examples of updating can be seen in the field of energy performance certification (Module I, Module II and Module III) <https://www.fsb.unizg.hr/encert/index-pocetna.html>, and in the training within the field of pressure equipment that was conducted in accordance with the Regulation and Ordinance in this particular field https://www.fsb.unizg.hr/ctt/seminari_2012/oprema_pod_tlakom.pdf.

In 2016, CTT has held 9 professional seminars attended by 158 participants, and since October 2017, 9 professional seminars attended by 78 participants. All seminars conduct survey on the satisfaction of the participants with the training program. The example of the survey (adapted to every seminar): [Anketa – sigurnosni ventili i tlacna oprema](#) for the professional seminar titled 'Pressure equipment – Safety valves and the preparation for periodic inspections'.



Teaching process and student support

3.1. Admissions criteria or criteria for the continuation of studies are in line with the requirements of the study programmes, clearly defined, published and consistently applied.

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 prior knowledge, which is aligned with the requirements of the study programme.

The higher education institution has effective mechanisms for recognising prior learning.

Admissions criteria are defined after the University has issued a call for the proposals of admissions quotas. Based on the analysis of enrollments in previous academic years along with current needs and capabilities, the proposed admissions criteria are submitted and adopted at the Faculty Council meeting. After they have been adopted and published by the University, admissions criteria are also published on the Faculty's websites: https://www.fsb.unizg.hr/?razredbeni_postupak.

Admissions criteria clearly define a classification procedure i.e. the evaluation of high school GPA, State Matriculation Exam level, assessments of additional students' knowledge and skills. Applications are processed through the NISpVU system: www.postani-student.hr.

For students who opt for the continuation of their studies, either by transferring from other study programmes to the undergraduate studies at FAMENA, or transferring from other higher education institutions, criteria for the admissions or continuation of studies are also clearly defined. Consequently, the Faculty decides upon the criteria for student transfer from some other study programme to the undergraduate studies at FAMENA. These criteria are published on the Faculty's websites. Similarly, after the Faculty Council's decision and call for submissions have been announced, the criteria for admissions to the graduate studies at the Faculty are submitted to the University. Admissions terms, admissions quotas and study programmes required for enrolling in the graduate studies at FAMENA as well as classification procedures are all clearly defined in the entry application. Since the Faculty Council decides upon course equivalences (possible differences between the courses students have taken and passed, hereafter referred to as differential courses), study terms during the differential semester or the differential academic year are also defined by the Faculty Council's decision. After a transfer student's application has been processed, the candidate is given a list of differential courses. The list is drawn up by the head of the study programme or specialization through a course articulation process and is also signed by the ETCS Coordinator and the Vice Dean for Education.

Academic success of students involved in some international student exchange programme is recognized in accordance with the Regulations on Mobility at the University of Zagreb, a previously drawn up and signed learning contract and the table of course recognition. If students obtain the ECTS credits for successfully completed extracurricular activities in Croatia or abroad, in line with the Regulations on the Allocation of the ECTS Credits for Extracurricular Activities at the University of Zagreb and a valid proof of the activity completed, the obtained credits are recognized as a corresponding course or diploma supplement.

Every year the analysis of enrollments and pass rates is presented in the Dean's report at the Faculty Council. The criteria for admissions and student transfer are discussed at the meetings of the Committee for Study Programmes in order to formulate a proposal, which is considered by the Faculty Council. The Faculty Council needs to decide upon the proposed points. The minutes of the Committee for Study Programmes meeting, held on May 24, 2017, when the admissions to the Dislocated Undergraduate University Programme of Energy Efficiency and Renewable Energy Sources in Šibenik were considered, is an example of the above mentioned practice.

Admissions quotas for undergraduate studies along with the FAMENA facilities and labour market needs are also analyzed. For example, the analysis presented at the Faculty Council meeting held on January 24, 2017, preceded the decision on raising admissions quotas for the undergraduate course in mechanical engineering.

Analysis of the number of applications and enrollments, given in the Table 3.2 (in attachments), clearly shows an increase in high school leavers' interest in the study programmes at FAMENA as well as high school and Matriculation exam general point average (GPA) of the applicants.

As shown in Table 3.3 (in attachments), there are students from other higher education institutions who apply for admissions to the graduate studies at our Faculty. However, this number is not very high since there is a difference in the duration of the undergraduate and graduate studies at our Faculty and the corresponding studies at other higher education institutions in the region. Still, it should be pointed out that a very high percentage of our students who have completed their undergraduate studies continue with the graduate studies at our Faculty. Namely, 96.43% of students or 1,136 out of 1,178 students who were awarded their bachelor degrees, have continued their graduate studies in the last five academic years.

One of the tasks of the Vice Dean for Education is to continually analyze the number and structure of student applications. Student applications for transfer from other study programmes or other specializations as well as for transfer from other higher education institutions are dealt with promptly. In coordination with the ECTS coordinators and the heads of study programmes and specializations, students' prior learning is checked, and if it complies with the Faculty Council's resolution, students' applications are accepted. The terms of student transfer are clearly defined and have been published in the Resolution on the Terms of Student Transfer to Other Study Programmes issued by the Faculty of Mechanical Engineering and Naval Architecture.

3.2. The higher education institution gathers and analyses information on student progress and uses it to ensure the continuity and completion of studies.

Procedures for monitoring student progress are clearly defined and available to students.

The information on student progress in the study programmes is regularly collected and analysed.

The higher education institution ensures adequate mechanisms for analysing student performance and pass rates, and initiates necessary actions accordingly.

Pass rates are regularly monitored and presented in the reports of the Vice Dean for Education, as shown in Tables 3.4 and 3.5 (in attachments). Lower pass and completion rates have been observed at the undergraduate studies in naval architecture. This might be so because high school leavers with higher GPA show less interest in studying naval architecture (Table 3.2, in attachments). However, the pass and completion rates for the undergraduate studies in mechanical engineering and aeronautical engineering are in line with the pass and completion rates at the University of Zagreb

Students who enrol in our graduate studies are the ones who have completed their undergraduate studies at our Faculty and possess satisfactory and solid prior knowledge, this being confirmed by the pass and completion rates of our students in the graduate studies.

In order to increase pass and completion rates, students are given an opportunity to take elective courses (e.g. Introduction into Engineering) and to get course mentors. Also student forums are organized to provide students with essential information.

Pre-exams and continuous student performance monitoring has been introduced in many study programmes. In addition, at the beginning of each academic year, the Vice Dean for Education draws up a plan of pre-exams in cooperation with the teaching staff and has it published on the Student Affairs Office's websites. Pre-exam plans and the published exam dates allow students to better organize their duties and make their own exam schedules.

Since students tend to retake certain second-year courses without sitting exams, it has been decided to set the pre-exam requirements for some courses. Thus, this problem of taking courses without attending the corresponding lectures and exercises or sitting the required exams, is solved. This is one of the measures taken to increase completion rates or to reduce the number of students who cannot continue their studies because they have failed to meet the requirements after the second enrollment.

The Curriculum Committee, when devising new study programmes, tends to consider pass rates, too. They distribute the courses of the newly proposed study programmes in such a way so that the courses usually considered to be the most demanding ones get evenly distributed during the first semesters of the studies.

In addition, well organized classes contribute to higher pass and completion rates. Since the undergraduate and graduate study programmes are intended for full-time students, the timetables are carefully drawn up so that there are no collisions. Hence, students are enabled to attend the classes regularly. Owing to the efforts of the Computer Centre, the timetable is successfully coordinated with the availability of the teaching staff and spaces (lecture halls, classrooms and laboratories). The final course timetable is drawn up before the academic year starts, i.e. before the enrollment date for both winter and summer semesters. By doing so, students get to know when the courses they have selected from two different study years as well as elective courses are to be taught. Teaching staff are encouraged to organize classes in smaller groups that would suit specific modes of teaching (auditory exercises, laboratory and design exercises, seminar exercises) whenever the teaching and space possibilities allow that. A system of student demonstrators represents a good example of this policy. Student demonstrators are selected among senior year students and are appointed to help other students with their exercises or when preparing for their exercises and pre-exams.

3.3. The higher education institution ensures student-centred learning.

The higher education institution encourages various modes of programme delivery, in accordance with the intended learning outcomes.

Various teaching methods are used that encourage interactive and research-based learning, problem solving and creative and critical thinking (for example, individual and group projects, cooperative learning, problem-based learning, field work and other interactive methods).

The HEI continually evaluates and adapts teaching methods and different modes of programme delivery.

Teaching methods are adapted to a diverse student population (non-traditional student population, part-time students, senior students, under-represented and vulnerable groups** etc.).*

The higher education institution ensures the use of state-of-the-art technologies to modernise teaching.

Available and committed teachers contribute to the motivation of students and their engagement.

The higher education institution encourages autonomy and responsibility in students.

The Faculty fosters various modes and methods of teaching such as conventional teaching, hybrid teaching, e-learning, individual tutorials, project work, laboratory exercises and experimental work, seminars, invited lectures of experts coming from industry and field work.

Before the academic year starts, teaching staff can modify their teaching schedule if interested. The Vice Dean for Education invites all the interested teachers to apply for a change to the Curriculum Committee. If the application gets approved by the Curriculum Committee, all the changes are entered into the ISVU system and course plans in course teachers' Atlantis system.

Course teachers are required to publish their tutorial hours.

Traditionally, fieldwork is organized for the students of certain study programmes, specializations or sub-specializations. The aim is to enable students to get an insight into what is really done in industry. Fieldwork is organized both in Croatia and abroad and it lasts from 1 to 4 days. For the last eight years it has not been financed by the Ministry of Science, Education and Sports but by the Faculty itself. Every year, based on the analysis of the number of students in each study programme and specialization, financial resources are distributed and financial support is approved according to the fieldwork plan submitted by the heads of the study programmes and specializations.

Student practice work is part of all study programmes at FAMENA. It is done as part of student training programmes in Croatian companies and abroad or it is done in laboratories as part of laboratory exercises in certain courses. Student training programmes are obligatory for the 6th semester students of mechanical engineering and aeronautical engineering at the undergraduate studies (Student Training Programme in Industry I) and for the 1st semester students at the graduate studies (Student Training Programme in Industry II). Students of naval architecture also need to do two student training programmes. The first training programme, which introduces students to production processes in shipbuilding, is part of the undergraduate studies and is done in the 6th semester. The other one is done in the 2nd semester of the graduate studies and it enables students to learn about the initial stages in the process of shipbuilding, such as ship design, writing technical documentation, shipyard organisation and operation). Student training programmes play an important role in the education of future engineers. That is an occasion on which most students get involved in a real working environment for the first time. These programmes are usually done outside the regular teaching schedule in the semester, i.e. usually during the summer holidays. All the activities related to the selection of a student training programme, referring students to the selected companies, conducting student training programmes as well as writing reports on students' performance are clearly defined in the Regulations on Student Training Programmes, published on the Faculty's websites, www.fsb.unizg.hr/?industrijska_praksa. A new web application- the Student Training Programme Portal, is currently being

developed. It will enable students to select a training programme according to their competencies and interests. It will also allow companies to find training students that will suit their needs and interests. This new portal will help both students and companies to get in contact more easily.

A lot of student undergraduate and graduate theses deal with specific problems in industry and are result from the cooperation between students, teachers and the companies involved in student training programmes.

The assessment of teaching modes and methods is done through student surveys. Based on the University's teacher surveys done in cycles, a pen and paper survey is done every three years, while annual surveys are done through the ISVU system. The results of the pen and paper surveys are delivered to the Dean by the URKV while, in accordance with the in-house verbal agreement, the Dean sends the survey results to the Head of the POKva to be distributed to all the teaching staff whose teaching activities have been assessed. Teaching staff can view the survey results through the ISVU Teacher Portal or through their own Atlantis system. They are expected to take survey results and possible comments on their teaching seriously in all aspects.

Teaching modes are in line with the study terms and conditions that regulate students' rights and obligations at the Faculty. For the last five academic years, 59 student contracts have been signed while seven applications of student athletes were filed in the 2017/2018 academic year.

The Faculty is required to ensure reasonable adjustments so that students with disabilities and students with learning difficulties can fully participate in the education process (classes, exams etc.) as well as in all other benefits provided for students, as stated in the following standard.

The Faculty provides students with the use of advanced technologies in the teaching/learning process. A great number of classrooms, being equipped with computers, are actually turned into the PC classrooms. The Faculty has committed itself to providing students with the advanced computer tools. The licences for the necessary teaching software are obtained through donations or purchase. Most lecture halls and classrooms are equipped with computers connected to the Internet and overhead projectors so that teachers can use multimedia in their classes/lectures.

The Faculty also promotes the development of e-courses, i.e. the e-versions of the courses taught in the study programmes. There is a portal at the Faculty, <http://e-ucenje.fsb.hr/>, where a lot of courses, at different levels of e-learning, are provided through the Moodle system. Also there are teachers who use other e-learning systems. Quite a number of activities (the Best e-Course Competition, the e-Course Development Competition, etc.) are aimed at getting more and better-quality e-courses.

A lot of teachers take part in numerous projects run by different student associations. By offering their advice and expertise, both in the regular study programme courses and in the extra-curricular teaching and professional activities, they motivate their students to get involved more and work harder.

Teachers also encourage students to engage in professional and research work by co-authoring numerous student papers, presented on conferences and published in journals.

At the ceremony held to mark the Day of the Faculty of Mechanical Engineering and Naval Architecture, students are presented with the „Davorin Bezjanec“ awards, the Dean's awards and other certificates. The „Davorin Bezjanec“ award is presented to the students of the first three years of the undergraduates studies for their academic achievements in the last academic year. It comprises a written certificate and a financial award. The Dean's award is presented to the best student selected among excellent students of the undergraduate and graduate studies, for his/her special academic achievement and the promotion of the Faculty. The candidates are put forward to the Dean by student associations and the Faculty organizational units. The Dean's award includes a certificate and a financial award. Upon the completion of their undergraduate or graduate studies, the best students are given the Faculty Medal and they are presented with a commendation, out of the Latin commendation classification. A great number of the Rector's awards presented to our students (199 awards in different categories have been awarded in the last five academic

years) also illustrate a significant role of teachers in inspiring students and encouraging them to get involved in such projects. This is also a way to promote student's autonomy and responsibility. All these practices are aimed at boosting student excellence and developing autonomous and responsible students with cutting-edge competitive skills.

3.4. The higher education institution ensures adequate student support.

The higher education institution provides guidance on studying and career opportunities to students (for example, tutors, supervisors and other advisers as a support in student learning and progress).

The higher education institution has established functional procedures for student career guidance, psychological and legal counselling, support to students with disabilities, support in outgoing and incoming mobility, and library and student administration services, at university of faculty level.

Students are informed about the available support services.

Student support is tailored to a diverse student population (part-time students, mature students, students from abroad, students from under-represented and vulnerable groups, students with learning difficulties and disabilities, etc.).

The higher education institution employs an adequate number of qualified and committed professional, administrative and technical staff.

Students are provided with the necessary information, advice and counselling about pursuing their studies through the Student Affairs Office or by the Head of the Legal Service, officers at the Student Desk, officers of the Undergraduate and Graduate Examination Service and from the Vice Dean for Education. Heads of courses and specializations and teachers are also involved in counselling through tutorials and student forums. Students can also get first-hand information and advice on how to get a scholarship or a job from the companies that take part in the Career Days, traditionally, held on the occasion of the Faculty Day.

As stated in Standard 3.1, student mentors are assigned to all first-year students following the Regulations on the University Undergraduate and Graduate Studies at FAMENA, Article 13. Students are provided with a list of mentors on the Faculty websites or their official email addresses, as was done in the 2017/2018 academic year. Student mentors are recruited among our teaching assistants and post doctoral students (who mostly obtained their degree at our Faculty). They help first-year students to get around the Faculty, advise them on study skills, course enrollment, study strategies etc.

Students with disabilities as well as students with learning difficulties exercise their rights through the Student Affairs Office or the Coordinator for Disabled Students, i.e. a member of teaching staff appointed as a Coordinator for Disabled Students. The Coordinator serves as liaison between disabled students, teaching and administrative staff at the Faculty and the Office for Disabled Students at the University of Zagreb. Disabled students and students with learning difficulties apply to the Coordinator to get support for teaching, learning and assessment practices, provided as the necessary adjustments to their capabilities (disadvantages) or for any other problems they might have in their studies. In line with the guidelines given in the University Code of Practice for Students with Disabilities certificates of reasonable adjustment of teaching and assessment practices are issued for those students to present to their course teachers before attending classes or sitting exams. Currently, three students with disabilities and fourteen students with learning difficulties, awarded with these certificates, are involved in the studies at the Faculty.

In addition, since the 2011/2012 academic year students have been provided with an elective technical course called the Peer Support for Students with Disabilities in which disabled students make their own individual study plans together with other students taking the course. Every year the Faculty announces a proposal for and allows for enrollments in this course as an elective non-technical course.

When in need of some psychological counselling, these students are referred to the Student Counselling and Support Centre.

The Project Administration and Mobility Office is responsible for keeping students and staff informed on mobility programme recruitments for students, teaching and non-teaching staff. It organizes the international exchange of students, teaching and non-teaching staff, cooperates with the University's offices in Zagreb as well as with the agencies and the ministries in charge of the implementation of mobility

programmes. It also organizes workshops, seminars and other activities to get students and staff at the Faculty informed and trained in relation to mobility programmes:

- <https://www.fsb.unizg.hr/index.php?uzms&home>.

Mobility administration is based on the international agreements signed between the Faculty and foreign institutions. The Office keeps files on foreign faculties our Faculty has signed agreements with. These files are available to students, teaching and non-teaching staff on the Faculty's websites:

- <https://www.fsb.unizg.hr/index.php?uzms&sporazum> and
- https://www.fsb.unizg.hr/index.php?uzms&ostali_sporazumi.

The courses students involved in mobility programmes have passed are recognized in accordance with the Learning Agreement signed by the student, his/her faculty and the sending institution. The Learning Agreement at the Faculty is signed by the ECTS Coordinator, and it is approved and filed by the Project Administration and Mobility Office. The guidelines for the outgoing student mobility Learning Agreement is available on the following website: https://www.fsb.unizg.hr/index.php?uzms&razmjena_studenti.

A list of courses in English for incoming student mobility are available on the following website:

- https://www.fsb.unizg.hr/index.php?uzms_en&programmes_english_courses.

The Office helps incoming students with the enrollment procedures. All the information is available on the following website: https://www.fsb.unizg.hr/index.php?uzms_en°ree_seeking_students.

It gives incoming students all support when registering in the Republic of Croatia by providing them with the necessary information, also published on the following website:

- https://www.fsb.unizg.hr/index.php?uzms_en&exchange_students,

by issuing the necessary papers and by connecting incoming students with their Croatian buddy students. Croatian buddy students help incoming students to navigate the Faculty and the institutions they have to register in, to overcome the language and intercultural problems and to give them information about student life at the Faculty. The Project Administration and Mobility Office also organizes short beginners courses of Croatian language and culture. A good example of such a practice can be found on the following website:

- https://www.fsb.unizg.hr/index.php?uzms_en&exchange_students.

To promote mobility, the Faculty has adopted a Resolution on One-time Financial Support for Exchange Students. Based on their registration and admission to a foreign faculty and in line with this resolution, students were awarded a grant by the Faculty. Students are awarded grants at the beginning of each academic year. There is an example given on the following website:

- <https://www.fsb.unizg.hr/atlantis/web/sites/uzms/content/584/295/Odluka.pdf>

The Faculty of Mechanical Engineering and Naval Architecture Library is an academic library whose primary purpose is to serve the Faculty's research and educational goals providing IT and communication support through its collections of various resources and services. Although primarily intended for the use of students and faculty, an open access is granted to visitors in search of specific literature or information related to the fields of mechanical engineering, naval architecture and aeronautical engineering.

Located on the ground floor of the South Building, it offers an easy access to both students and any other users. The Reference Library Reading Room is equipped with computers so that students have an open access to the library resources. The Library also comprises two air-conditioned study spaces that are conducive to academic work.

Along with standard editions and reference resources, such as dictionaries, encyclopaedias, textbooks, lexicons etc, the Library holds principal collections of scientific and professional publications in technical sciences and comprehensive collections in the fields of mechanical engineering, naval architecture and aeronautical engineering. It also provides the recommended subject specific reading and exam literature for

other courses and study programmes taught at the Faculty, e.g. mathematics, physics, marketing, ecology, foreign languages etc. The Library is dedicated to continually growing and updating its collections.

The Library staff are always there for students and help them to find relevant sources of information. Apart from book collections, the Library also provides access to various databases, both bibliographies and the databases with complete texts. The Library staff organizes workshops on searching scientific and professional information throughout the academic year.

Each academic year, before the classes start, the Computer Centre opens the AAI@EduHr (the **A**uthentication and **A**uthorization **I**nfrastructure of the **S**ystem of the Science and Higher Education in the Republic of Croatia) user accounts for all new students and it opens and maintains their email user accounts throughout their studies. All first-year students receive at their email addresses a presentation about study programmes and studying at the Faculty of Mechanical Engineering and Naval Architecture along with the Regulations on Study Programmes and Studying at the Faculty immediately after the introductory lecture. During their office hours all the staff members of the Computer Center are available to students to help them with any problem that is part of their expertise (the ISVU system, computer classrooms, e-learning, user accounts, etc.)

Students get informed about the services provided by the Computer Centre through student forums (organized at the beginning of each academic year as an introductory class for the first-year students to get all the necessary information about the services available to them), on websites or by contacting particular services and their staff.

The number, educational background and availability of administrative staff:

Student Affairs Office – There are five staff members working in the Student Affairs Office: head of the Office (college qualifications), Professional Adviser for the Postgraduate Studies (university qualifications), head of the Department of the Undergraduate and Graduate Examinations (secondary school qualifications), head of the Student Desk for the undergraduate and graduate studies (secondary school qualifications) and a clerk (secondary school qualifications).

Its working hours are from Monday to Friday, 8.00 am-4.00 pm, and the opening hours are from 10.00 am to 12.00 pm. The opening hours of the Student Desk for the undergraduate and graduate studies are from 11.00 am to 1.00 pm every working day.

Project Administration and Mobility Office – There are three staff members in the Project Administration and Mobility Office, all of them with the university qualifications. Their working hours are from 8.00 am to 4.00 pm every working day.

Library – In the Faculty of Mechanical Engineering and Naval Architecture Library there are four staff members: head of the Library, who is a library adviser (PhD degree), two Library Science graduates (Master degree) and an associate. The Library staff are enabled to continually develop their professional skills by participating in different conferences and symposiums in Croatia and abroad or by attending lectures at the Centre for Continuing Professional Development (CSSU – <http://www.nsk.hr/cssu/>). The Faculty Board (governing body; the Dean and the Vice Deans) also supports and funds their postgraduate scientific studies. The opening hours of the Reference Reading Room is from Monday to Friday, 8.00 am-6.00 pm while two Student Reading Rooms are open to students from Monday to Saturday, 8.00 am-10.00 pm.

Computer Centre – There are four staff members working in the Computer Centre: head of the Centre (university qualifications), three associates – a system engineer, an information services administrator and a server administrator (all three with university qualifications), a senior technician – publishing (college qualifications), two technical associates (secondary school qualifications) and a computer clerk (secondary school qualifications). The Computer Centre's staff can continuously develop their professional skills by taking courses organized by CARNet and the University Computer Centre as well as by participating in conferences and symposiums in Croatia and abroad that are related to the ICT topics. The Centre's office hours when users can contact the staff are from Monday to Friday, 8.00 am-6.00 pm. However, since the Faculty's computer infrastructure is supposed to work continuously the Centre's staff are available whenever needed.

3.5. The higher education institution ensures support to students from vulnerable and under-represented groups.

The higher education institution monitors various needs of students from vulnerable and under-represented groups.

The higher education institution encourages interest in the study in students from vulnerable and under-represented groups.

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

The higher education institution invests resources in the support to students from vulnerable and under-represented groups.

In October 17, 2014, the Croatian Parliament adopted the Strategy of Education, Science and Technology that in the chapter related to higher education states several missions aimed to enhance the social aspects of higher education in Croatia. One of the tasks (Measure 6.2.2.) is to define under-represented and vulnerable groups in higher education and the reasons why a smaller percentage of those students are involved in higher education. The available empirical data on the vulnerable groups enrolled in higher education institutions in Croatia is collected and presented in the Study of Under-represented and Vulnerable Groups in Higher Education in Croatia. The interested parties are encouraged to have a public debate on this issue. Based on the specific measures to be formulated, the Faculty will define admissions and study procedures. However, currently, there are no definite resolutions and/or guidelines to follow.

The Faculty of Mechanical Engineering and Naval Architecture offers only full-time university studies and neither studies for external students (part-time students who study along with their jobs) nor professional studies are organized.

As for the vulnerable and under-represented groups of students coming from lower-educational background and lower socio-economic status, there are no relevant resolutions issued by representative bodies at higher levels about special admissions quotas or admissions criteria. In addition, a system of participation fees has been established in line with the Resolution of the Government of the Republic of Croatia and following the University's guidelines for the unified system of participation fees (without any possibility of taking socio-economic status into consideration). However, the Faculty, when possible, takes students' socio-economic status into consideration. For example, the Faculty, that financially supports outgoing mobility students, has decided to offer students with lower socio-economic status a higher financial support.

In line with the Croatian law, the children of the Croatian soldiers from the Homeland War are exempt from the determined admissions quotas and ranks. In the last academic year one student with that specific status enrolled in our Faculty.

Pregnant students and parenting students on maternity/paternity leave (till their child turns one) are granted their leave of absence and can resume the status they had when the leave began as stated in the Regulations on the Undergraduate and Graduate Studies at the Faculty of Mechanical Engineering and Naval Architecture, Article 10.

Students with disabilities and learning difficulties are approached in the recommended ways, as stated in the previous standard. All the data on these students are filed in line with the Personal Data Privacy Act. For example, students' personal data cannot be processed in the ISSP system when trying to get scholarships in the STEM field unless students' approvals have been obtained. The Faculty ensures that students with disabilities have access to its premises and facilities by installing ramps. Also students with disabilities are awarded with a car park entry barrier remote and are allowed to park their car, if that is how they get to the Faculty, in the staff car park.

Although an engineering faculty, female students are quite present at the Faculty of Mechanical Engineering and Naval Architecture. In the last five academic years, 2,739 first-year students have enrolled, 376 or 13.73%

of them being female students. There have been 131 female students (11,12%) out of the total of 1,178 students who completed their undergraduate studies, while out of the total of 1,087 students who completed their graduate studies, there have been 140 or 12.88% of female students.

3.6. The higher education institution allows students to gain international experience.

Students are informed about the opportunities for completing part of their study abroad.

The higher education institution provides support to students in applying for and carrying out exchange programmes.

The higher education institution ensures the recognition of ECTS credits gained at another higher education institution.

The higher education institution collects information on student satisfaction with the quality of HEI's support regarding practical matters of student mobility.

Students gain competencies required for the employment in an international environment.

In terms of student mobility, students most commonly participate in the ERASMUS+SMS and SMP programmes. They get informed on these two student mobility programmes through student forums- three forums on the Student Mobility for Studies (SMS) programme and one forum on the Student Mobility for Placement (SMP) programme. Since the SMS programme is the most problematic both for students and the institution the SMS forums are scheduled in line with the expected dates of a call for tenders and proposals. These forums are advertised by posters on bulletin boards and on the websites of the Faculty. The first forum is planned to take place in February, and it generally deals with the possibilities of international student mobility and the related problems. The second forum is organized shortly after a call for student applications has been issued with the aim of getting students informed on the possible changes required in comparison with the last year's applications. The third forum is held only for the selected students (only the selected students are invited) in order to give them instructions how to prepare a learning agreement, strategies for course selection and all other requirements in relation to particular foreign universities. Students who have participated in these programmes are always invited to the forums so that they can share their first-hand experiences with the prospective outgoing students or incoming students, if there are such students at the Faculty at the time when the forums are being held.

Apart from student forums, students get all the support needed in relation to applications for student mobility programmes, preparation and the time before and after mobility period from the ECTS Coordinator at the Faculty, the Project Administration and Mobility Office and, if needed, those students who have already participated in mobility programmes. Students are also provided with a list of courses previous mobility students took during their international mobility studies at foreign universities as well as a list of courses that were recognized in some of the study programmes at our Faculty. To make it easier for students to follow, the courses are presented in two different versions – the one in which courses are arranged according to study programmes and the other version with the courses arranged according to the universities at which they were completed. The aim is to reduce student stress related to studying at foreign universities.

Student Mobility for Studies under international mobility programmes is much more complicated than Student Mobility for Placement. Before commencing the International Student Mobility for Studies, students have counselling sessions with the ECTS Coordinator and/or the course coordinator and specialization head. Based on the course offer at the selected university and their study programme at our Faculty, students propose a Preliminary Table of Course Recognition in line with the Learning Agreement. The recognition of certain courses is checked with this table. After the necessary adjustments have been made, a Learning Agreement is drawn up in line with the table. Adjustments can be made during mobility period when it is necessary to change the Learning Agreement in order to ensure the recognition of the courses included in the study programme at the Faculty. Upon the completion of the mobility programme, all the courses completed are recognized as stated in the Table. When required, the Table can be changed in line with the Regulations on Mobility at the University of Zagreb. According to the data on outgoing mobility (Table 3.6, in attachments), in the last five years there have been 96 students in total under the mobility programme at our Faculty.

Since the 2016/2017 academic year the Faculty has been gathering data through anonymous surveys on how students are satisfied with the quality of support they get in relation to student mobility, preparation for the application process, monitoring of the mobility process and results recognition after completing their mobility period. The surveys are analyzed by the Vice Dean for Education and the ECTS Coordinator. Based on analysis results, the guidelines for further mobility developments are decided upon. Analysis results are filed in paper form by the Project Administration and Mobility Office, while they are kept in digital form by the ECTS Coordinator.

It is of vital importance for international mobility students to have a good knowledge of English or German, when participating in the mobility programmes in Germany, and to possess good communication skills. Our students attend courses in English or German as obligatory courses for two study years (four semesters). They have an open access to the well-known world databases of scientific and professional journals through the computer network at the Faculty. Visiting lecturers and experts coming from abroad give lectures and talks in English that all students can attend. Students of certain specializations have an opportunity to attend the European Global Product Realization Course, an international course in English, run in international teams. Every year the course is completed in the country of one of the partner universities. Students who have been selected for international mobility get informed on the basic concepts related to the international and multicultural context through student forums. Students can also get involved in buddy programmes to support foreign students. Some students participate in international scientific conferences as a help, while others actively take part in scientific-professional conferences presenting papers co-authored with their course mentors.

3.7. The higher education institution ensures adequate study conditions for foreign students.

Information on the opportunities for enrolment and study is available to foreign students in a foreign language.

The higher education institution provides support to foreign students in enrolment and study at the Croatian higher education institution.

The higher education institution collects feedback on satisfaction and needs of foreign students.

Foreign students have the opportunity to attend classes delivered in a foreign language (English).

Croatian language courses are delivered for foreign students at the level of the university or university constituent.

Students who would like to study at the Faculty of Mechanical Engineering and Naval Architecture can obtain all the necessary information from two sources: on the websites of the University of Zagreb, related to studying at the University of Zagreb, and on the Project Administration and Mobility Office's website. Apart from the links to the University's websites, these websites provide contact addresses, academic calendar, course offer in English and information on the possibility for students to get enrolled in an entire study programme. Besides the information found on websites, students are often provided with additional information by email.

To reduce incoming students' stress related to course selection as much as possible, it is the Faculty's policy to clearly define the incoming students' Learning Agreement prior to their arrival in Croatia. To ensure that incoming students can follow the lectures of the selected courses in English, they are tested to check if they meet the possible requirements. Incoming students get support not only from the Project Administration and Mobility Office and the ECTS Coordinator, but they are also supported by the Group for Supporting Incoming Students (buddy programme) that helps them with applications, various administrative procedures and with all other possible requirements imposed on them.

So far the Faculty has not been gathering any data on incoming students systematically, mainly because such data is collected by the Central Office for International Cooperation at the University of Zagreb. However, the Faculty is planning to do that in the future.

Incoming students are offered a number of courses taught to a certain degree in English. The number of foreign students attending the same course is relatively small (not more than three students) because, generally, there is a relatively small number of incoming students at the Faculty while, at the same time, quite a large number of study programmes are available to them. As a result, when taking courses incoming students are given three different options: 1) study literature, tutorials in English and exams in English, 2) study literature, tutorials in English and practical exercises in English, and 3) an entire course in English. Before signing a Learning Agreement, incoming students are informed on these three models. Sometimes, although incoming students have opted for one of the first two models, with the consent from the Croatian students attending the same course, the course is taught completely English.

The list of courses in English is continually updated with new courses. After having evaluated the Quality Assurance System, the A 21.7.1 activity (the resolution on the financial support for teachers who teach their courses in English) has been included into the Activity Plan for the period from October, 2014 to March, 2015. At the same time, the activities that will be organized to foster increased mobility and studying of foreign students are included in annual activity plans for constituent quality assurance (The Vice Dean for Education keeps inviting and encouraging teachers to offer their courses to foreign incoming students, too, while the ECTS Coordinator in cooperation with the Project Administration and Mobility Office systematically plans the activities related to incoming mobility and support of foreign students.).

Foreign incoming students who would like to learn Croatian are advised to check the sources on the University's websites. Exceptionally, in the 2017/2018 academic year a course of the Croatian language and

culture, funded by the ERASMUS+ programme, was organized for incoming students. The aim was not only to help incoming students to learn the Croatian language and culture, but also to meet other students and socialize with them in order to get integrated more easily in the new environment.

3.8. The higher education institution ensures an objective and consistent evaluation and assessment of student achievements.

The criteria and methods for evaluation and grading are clear and published before the beginning of a course.

The criteria and methods for evaluation and grading are aligned with the teaching methods used.

The higher education institution provides support to the assessors in the development of skills related to the testing and assessment methods.

If possible, the higher education institution carries out the evaluation of grading.

The evaluation procedures take into account special circumstances of certain groups of students (modifying examination procedures to suit e.g. students with disabilities), while at the same time ensuring the achievement of intended learning outcomes.

The students receive feedback on the evaluation results, and if necessary, guidelines for learning based on these evaluations.

Student assessment and monitoring modes are defined and published for each course. Before developing a syllabus for the next academic year, teachers are expected to define and update student assessment and grading criteria and methods that are incorporated in the course databases in the Atlantis system. They are, then, transferred into the ISVU system where they get visible to students:

- <http://www.isvu.hr/javno/hr/vu120/index.shtml>.

In their introductory classes and lectures teachers provide students with relevant information about their courses as stated in the Regulations on the Undergraduate and Graduate Studies, Article 39 and Article 40. A lot of courses have their e-versions, thus enabling students to get a better insight into the content, aims, learning outcomes of the courses and the course syllabi. In addition, the guidelines for taking a final exam and completing the thesis are also given: https://www.fsb.unizg.hr/?diplomski_ispiti.

Various modes of continuous assessment are carried out to suit different learning outcomes and the targeted competencies in courses: pre-exams, homework assignments, project work, seminar papers, oral exams or various combinations of all the mentioned assessment procedures. Since exam results and oral exams are open to public (students), impartiality and objectivity are ensured.

There is an officially defined complaint procedure in line with the Regulations on the Undergraduate and Graduate Studies at the University of Zagreb, Article 42. If a student believes a grade has been incorrectly assigned, he/she can appeal, requiring to be allowed to repeat the exam before the Committee. A well documented written statement should be sent to the Dean within 24 hours. A repeat will be organized within 3 working days from the appeal. The Dean appoints a three-member committee. One committee member is the course teacher who graded the appealing student while another one is some other course teacher. The Committee reaches a decision by a majority vote. The written exam is not repeated before the Committee. Instead the Committee grades the already written exam again. The Committee's duty is to keep a formal and accurate record of the exam, including the Committee's decision on the final grade, and to send the written record to the Dean.

To help all those involved in student assessment to develop the skills required for student testing and assessment, the Faculty financially supports teachers who want to attend workshops on how to define learning outcomes, assessment and grading methods and provides them with the relevant literature (e.g. *the How to Achieve the Desired Learning Outcomes in Study Programmes* textbook). The Faculty informs them on the available workshops and sends them calls for attending the workshops.

Assessment procedures carried out at the Faculty are not evaluated by any particular procedure. However, by analyzing student surveys and students' written appeals with regard to grading, the Faculty can identify any discrepancies.

Assessment procedures are adjusted to any special circumstances, as stated in the 3.4. standard, so that students with disabilities and learning difficulties related to speaking and reading skills are given certificates that provide them with the necessary adjustments when sitting exams.

In line with the Regulations on the University Undergraduate and Graduate Studies, Article 42, course teachers are required to make the graded written exams available to students during their tutorials. The results of written exams are published on the Faculty's website or on departments and chairs' noticeboards. Course teachers immediately after the oral exam inform students on the assigned grade. The entire exam needs to be completed within 5 days, except in case of some valid and well documented reasons.

3.9. The higher education institution guarantees the issuance of Diploma Supplements and adequate qualification information.

Upon the completion of their studies, students are issued appropriate documents (diploma and Diploma Supplement), which describe their qualification, achieved learning outcomes and the level, content and status of the study.

The diploma and Diploma Supplement are issued in accordance with relevant regulations.

Upon the completion of their studies students are awarded with a diploma and the Diploma Supplement.

The Diploma Supplement comprises:

1. Identifying the holder of the qualification (full name and surname, date and place of birth, student identification number)
2. Information identifying the qualification (name of qualification and title conferred, in Croatian and the original language, study fields, name and legal status of the higher education institutions where the study programmes are taught, name and legal status of awarding higher education institutions, the language in which the study programmes are taught)
3. Information on the level of the qualification (qualification level, official length of study, any special educational admissions requirements)
4. Information on the contents and results gained (study modes, regulations the study programme was certified by, programme details, grading scheme, grades and GPA, thesis title and how it was graded, acquired qualification level and any commendations for academic excellence, such as summa cum laude etc.)
5. Information on the possibilities for employment or further studies (employment possibilities, possibilities for further study)
6. Additional information (student awards, etc.)
7. Certification of the Diploma Supplement (full student name and surname, issued date and place, official seal)
8. Information on the higher education system in the Republic of Croatia (entire education system structure, higher education system levels, sources of information on the higher education system)

The Diploma Supplement is issued in line with the Act on Scientific Activities and Higher Education (Official Gazette no. 123/03, 105/04, 02/07, the USRH resolution, 46/07, 45/09 and 63/11), Article 84, Paragraph 5, and according to the guidelines drawn up by the Ministry of Science and Education.

3.10. The higher education institution is responsible for the employability of graduates.

The higher education institution analyses the employability of its graduates.

Admission quotas are aligned with social and labour market needs and available resources.

The higher education institution informs prospective students about the opportunities to continue education or find employment after graduation.

The higher education institution provides students with support regarding future career planning.

The higher education institution maintains contacts with alumni.

When considering admissions quotas, the Faculty analyzes the employability of its graduates by checking the data on registered unemployment provided by the Croatian Employment Service on its websites and the reported job vacancies. In the last five years, as shown in Table 3.7 (in attachments), the number of unemployed bachelors and masters has been significantly lower than the admissions quotas for our studies. On the one hand, information about employment possibilities is gathered informally through contacts that the Faculty's teaching staff maintains with industry as well as through students who quite often get employed before completing their studies. On the other hand, round tables are organized to obtain regular feedback from the prospective employers, labour market representatives and other relevant institutions. Valuable feedback is also gathered through an association of alumni (students who have graduated from our Faculty) and the Croatian Association of Engineers of the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb ([AMAC-FSB](#)).

Three years ago, based on the previously mentioned analyses, the Faculty Council decided to increase admissions quotas for the undergraduate studies of mechanical engineering by 30 students per year. Actually, there is an even greater need for the holders of Master degree in Mechanical Engineering in industry. Currently, the number of applicants to the graduate studies who have completed their undergraduate studies and thus meet the requirements is lower than the admissions quotas.

Understandably, admissions quotas should always be proposed in line with the Faculty's teaching and space resources. So the most recent increase in admissions quotas was based on the number of students enrolled. Namely, there were 1,675 full-time students at the undergraduate and 454 at the graduate studies. In total, there were 2,129 students at the Faculty of Mechanical Engineering and Naval Architecture. There were 238 teaching and research staff so that the student-teaching staff ratio was 8.94 (2,129 students/238 teaching staff). As stated in the Ordinance on the Content of a Licence and Conditions for Issuing a Licence for Performing Higher Education Activity, carrying out a Study Programme and Re-Accreditation of Higher Education Institutions the ratio of students to full time academic staff, including teaching assistants and research staff if they do the teaching, mustn't be greater than 30:1. Teaching facilities available for performing higher education activities presented as the ratio of enrolled students to the size of teaching/learning premises (lecture halls and laboratories) was $9,094/2,129 = 4.27\text{m}^2$ of usable space per student.

As stated in the Ordinance on the Content of a Licence and Conditions for Issuing a Licence for Performing Higher Education Activity, carrying out a Study Programme and Re-Accreditation of Higher Education Institutions, the adequacy of teaching facilities is established by the ratio of the anticipated number of enrolled students to the size of usable space, in the manner that there should be 1, 25 m² of usable space per student. Obviously, according to the information given above, the Faculty of Mechanical Engineering and Naval Architecture not only provides satisfactory teaching facilities (teaching staff and teaching/learning space) but it keeps improving and increasing them continually.

The Faculty employs various ways, formal and informal, of keeping students informed about different possibilities for the continuation of education or for employment. Namely, students are informed about the possibilities to continue their studies at higher study levels at student graduation ceremonies (students who have completed their undergraduate studies get informed about graduate studies while those students who

have completed their graduate studies get informed on professional or doctoral studies) or on the Faculty's websites. Successful students are also encouraged by teaching staff to continue their studies at the doctoral study level.

The Faculty regularly publishes job vacancies on its website and organizes the Career Days where different companies provide students with the information about employment possibilities. Many companies get in contact with teaching staff in search of prospective employees. Mentors then refer their recent graduates to those companies.

Alumni are contacted through teaching staff, mostly students' undergraduate or graduate thesis advisers who are in contact with their former students. In addition, the Faculty accommodates a number of alumni professional associations. It also organizes different professional lectures, seminars and round tables as effective ways of maintaining contact with former students. The AMAC-FSB alumni association is one of the associations that contributes to these activities. It is also possible to connect with alumni through social networks, such as LinkedIn groups, e.g. Industrial Engineering and Management Alumni Group, FSB, Materials Engineering, AMAC-FSB, Croatian Association of Engineers of the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb.

IV

Teaching and institutional capacities

4.1. The higher education institution ensures adequate teaching capacities.

The number and qualifications of teachers are appropriate for the delivery of study programme and achievement of the intended learning outcomes.

The ratio of students and full-time teachers at the higher education institution ensures a high quality of study.

Teacher workload is in line with relevant legislation

Teacher workload ensures appropriate distribution of teaching, scientific/artistic activities, professional and personal development and administrative duties.

The Faculty employs a sufficient number of appropriately qualified teachers to achieve educational goals and deliver a wide range of courses offered (MOZVAG tables 4.1, 4.3, 4.4). If for the purpose of calculating the student/teacher ratio only the total number of teachers is taken into account, the ratio for the academic years 2007/08 to 2011/12 ranged from 16.5 to 19.2. Over the last five years the ratio ranged from 16.4 to 17.6. If the total number of associates (assistants, postdoctoral researchers) is also taken into account, the ratio ranges from 10.8 to 15.2. The ratio for the academic year 2016/17 is 16.4, if only the teachers are taken into account or 10.8 if associates are also included. These ratios meet the requirements under the Regulations on the Content of the Accreditation and the Requirements for Issuing the Accreditation to HEI for Providing Higher Education Activities, Delivering a Study Programme and HEI Re-accreditation,

- https://narodne-novine.nn.hr/clanci/sluzbeni/2010_02_24_575.html.

The teaching workload is governed by the provisions of the Collective Agreement

- https://narodne-novine.nn.hr/clanci/sluzbeni/2010_12_142_3607.html

that was in force till December 2013. The problem here is that since the implementation of the Bologna process, the teaching workload of the Faculty employees has not been evenly distributed (according to the 2012 Re-accreditation data, the teaching workload of some of the teachers at the home institution expressed in statutory teaching hours was approximately 1000 hours

- https://www.fsb.unizg.hr/atlantis/upload/newsboard/20_01_2014_20102_Samoanaliza.pdf.

In the past few years efforts have been made to equalize the workload among the teachers and accordingly new teachers and associates have been employed at the chairs and departments having a greater teaching workload. As of 2017, a portion of teaching on the modules of overloaded departments (fundamental course modules) has been delivered by younger teachers and assistants from under-loaded departments. The management of the Faculty gives a great support to the Human Resources Committee in their effort to balance the teaching workload of chairs and departments.

4.2. The higher education institution has an objective, transparent and excellence-based procedure of teacher recruitment.

Teacher recruitment principles and procedures are aligned with HEI development goals.

In the selection, appointment and evaluation of teachers, HEI takes into account their past activities (teaching, research, student feedback, etc.).

Teacher recruitment procedures are appropriately regulated, transparent and have been consistently applied and implemented.

The higher education institution has appropriate methods for selecting the best candidates for each position.

The development and improvement of human resources represent one of the strategic goals of the Faculty. The Human Resources Committee, acting as the dean's advisory panel, is composed of members from each department appointed for a four-year term of office.

The recruitment of teachers and associates in the last three academic years was carried out through the internal announcements of vacancies as an internal competition and the model of the job creation process. The number of new positions depends on the number of the retired teachers, the available development coefficient as well as the departments' needs. The Decision on the required standard for employing new teachers was passed at the Faculty Council meeting held on 19th September 2017, under agenda item 4.4.1. It sets out the teaching workload at the department level

- https://www.fsb.unizg.hr/sjednice_pregled.php?id_sjednice=54&list=dnevni_red

required for the recruitment of teachers or associates aiming to decrease the variation in workload of teachers and associates of their respective departments.

In order for a teacher or an associate to be employed, there must be an expressed need for teaching demonstrated by the department by means of the Workload Tables (this and all other announcement documents are available at www.fsb.hr, under Atlantis, Minutes of the 2015/16 academic year, or Minutes of the 2016/17 academic year, under Dean's advisory panels, Human Resources Committee, Documents required for the appointment to research and teaching ranks, teaching ranks and associate ranks, and the recruitment and selection process for FMENA posts). The departments/independent chairs submit to the Human Resources Committee their needs for recruitment of teachers, and attach the Workload Tables comprising the data on their teachers' and associates' workloads. Members of the Human Resources Committee (one from each department, a deputy in the event of absence or unexpected commitment) are responsible for verifying the accuracy of the data provided by the respective department. The Human Resources Committee discusses each and every proposal and passes their decision based on the teaching workload information and the development of the department'/chair's areas of research. The Chair of the Human Resources Committee explains the selection proposal to the Dean. If the Dean is satisfied with the proposal (so far he has always been satisfied), he proposes to the Faculty Council the adoption of the proposal for new assistant professor posts to be required with the University. So far, the Faculty Council has not rejected any proposal of the Human Resources Committee. The Committee carried out the new position creating procedure at its meetings held on: 19th Jan. 2015, 19th May 2015, 7th July 2015, 16th Dec. 2015, 11th April 2016, 10th Oct. 2016, 12th June 2017 (cancelled announcement) and 21st Nov. 2017. All documents, adopted at the respective sessions of the Faculty Council held after the Committee meetings, are available on the website: <http://titan.fsb.hr/~kadrovska/> (protected by a user name and a password). The Minutes of the Human Resources Committee are available to all employees at www.fsb.hr, under Atlantis, Minutes of the 2015/16 academic year, or Minutes of the 2016/17 academic year, under Dean's advisory panels, Human Resources Committee, Human Resources Committee Meetings).

Prior to the vacancy announcement, the Faculty Council shall elect a three-member selection committee, whereby one member of the committee may not be a FMENA teacher. The vacancies shall be announced

publicly (Večernji list, Narodne novine, Faculty website <https://www.fsb.unizg.hr/?&cat=299&a=1>, EURAXESS job portal). Applicants must meet all the requirements set forth by the law, as well as the terms and conditions of the Rectors' Conference. Applicants shall be ranked primarily according to scientific excellence, indicators of engagement in teaching and then according to all other achievements. The three-member committee shall submit to the Faculty Council a report on all applicants and a proposal for the best candidate selection. The Faculty Council chooses the best candidate by secret ballot, but leaves the final decision on the selection to the University.

4.3. Teacher and scientist/artist advancement is based on objective and transparent procedures.

The higher education institution uses objective and transparent academic promotion procedures.

Academic promotion procedures are based on assessment and rewarding of excellence.

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

Important achievements (such as international contribution to the scientific discipline, high-impact publications, significant scientific discoveries, successful projects, success in securing additional funds, supervision of final and graduation theses, authorship of textbooks / study materials, popular lectures etc.) are taken into account when considering teacher advancement.

Indicators of excellence include scientific/artistic, teaching and professional contribution.

For the promotion of teachers in the last three academic years, an internal selection procedure for teachers and associates was announced and conducted. The number of posts depends on the number of retired teachers and the expressed needs of departments. All applicants for a teaching post must submit:

1. The letter of the department indicating the wish of the department for the applicant's promotion
2. A table of achievements showing the entire scientific, teaching, professional activity and the contribution of the applicant to the work of FMENA as well as the wider scientific community
3. A short CV of the applicant specifying in particular the activities that are not included in other documents
4. A list of papers compiled in a way that allows for an easy overview of the paper category, and the journal quartile for the papers of the highest category published there
5. Rectors' Conference Prerequisites Table filled in and signed by the applicant confirming the data accuracy
6. Academic ID card.

The Chair of the Human Resources Committee prepares a table with the applicants' data and presents it at the Human Resources Committee meeting. The Members of the Committee are responsible for verifying the data accuracy of the applicant of their respective departments. Then, the applicants are ranked primarily by scientific excellence, indicators of engagement in teaching and performance in teaching process and education of young scientists and teachers, and then according to all other indicators included in the table.

At its meetings, the Committee presents each applicant's case pointing to the particulars of an individual applicant that may not be known to all Committee members.

Having passed the decision, the Chair of the Committee explains and substantiates the selection proposal to the Dean. If the Dean is satisfied with the proposal (so far he has always been), he proposes to the Faculty Council to adopt the proposal for promotion of the selected candidates. So far, the Faculty Council has not rejected any proposal of the Human Resources Committee (although each applicant is voted on by secret ballot).

The Committee carried out selection procedure at its meetings held on: 19th Jan. 2015, 19th May 2015, 7th July 2015, 16th Dec. 2015, 11th Apr. 2016, 10th Oct. 2016, 10th Feb. 2017, 12th June 2017 (cancelled announcement) and 21st Nov. 2017. As mentioned in the previous standard, all documents adopted at the respective sessions of the Faculty Council held after the Committee meetings are available on the website: <http://titan.fsb.hr/~kadrovska/>, and all minutes are archived in the Atlantis system.

Efforts made by teachers in teaching, research and particularly proactive approach at the Faculty, may be commended on or awarded medals or grand medals of the Faculty (see [Employee Rewards Scheme](#)). The guidelines and parameters for evaluating research activities were adopted at the Faculty Council meeting

held on 17th March 2015, under agenda item 2.4.2, in addition to which weights shall be assigned to each parameter. The aim of the drafted document is to regulate the awards to be given at the Faculty anniversary in recognition of outstanding scientific achievements. The Committee entrusted with the development of weights for each activity held several meetings and concluded that it was extremely difficult to contrastively compare appropriate parameters, and reported their conclusions to the Faculty Management. Moreover, even within the same category, the corresponding work cannot be evaluated only according to the scientometrics data. Therefore, a new committee was proposed to select among the proposed candidates those to be rewarded, by applying the adopted parameters.

4.4. The higher education institution provides support to teachers in their professional development.

The higher education institution provides opportunities for the improvement of teaching competencies at the level of the university or university constituent.

The higher education institution encourages the assessment and improvement of teaching competencies based on the peer-review recommendations and the results of student satisfaction surveys.

Teachers participate in international programmes, projects, networks etc.

The Faculty provides support to the teachers in the field of teacher training and improvement of teaching competencies by organizing workshops at the Faculty and by encouraging teachers to participate in workshops held in other institutions or in the Centre for Teacher Competence Development of the University of Zagreb

- <http://www.unizg.hr/studiji-i-studiranje/cjelozivotno-obrazovanje-i-usavrsavanje/podrska-nastavnicima/>.

At The Faculty workshops for postgraduate thesis advisors have been organized

- https://www.fsb.unizg.hr/arise/5_c4d_specialconditions_en-ARISE.pdf?poruka_v&id=23449&a=1

as well as workshops for teachers, e.g. in 2014 six workshops were organized,

- http://me4catalogue.sfsb.hr/dogadanja/radionice_za_nastavnike/radionica_za_nastavnike_na_fsb/default.aspx,

with the following topics: learning and teaching approaches, learning outcome-based curriculum development, learning outcome assessment; and a two-day workshop on active learning,

- https://www.fsb.unizg.hr/?poruka_v&id=20935&a=1,

which the Faculty organized as a partner on the IPA IV project „ME4CataLOgue (Mechanical Engineering for Catalogue) – Croatian Catalogue of knowledge, skills and competences for Mechanical Engineering studies (Bachelor, Master and Doctoral study programmes) based on learning outcomes“ within the project „Further development and implementation of the Croatian Qualifications Framework“, whose aim was to set standards of qualifications for the studies in mechanical engineering based on learning outcomes. In 2015 in collaboration with the University Centre for Teacher Competence Development two workshops for teachers on the fundamentals of learning outcomes (definition and assessment) were planned, primarily intended for younger teachers who were in the process of appointment to an assistant professor position. In 2016 two workshops titled „How to improve your teaching skills?“ were held, in which 25 teachers participated (<https://www.fsb.unizg.hr/?poruka&id=25056>). Also, the vice dean responsible for education sends the teachers per e-mail manuals on curriculum development, teaching methods, and assessment and grading student achievement. At the level of chairs teachers provide support to teaching assistants and newly employed teachers with the aim of developing and further improving teaching competencies (consultation meetings between teacher and teaching assistant prior to each exercise class – discussing the tasks and the exercise topics, the teaching assistants attend exercises held by the teacher and vice).

Apart from participating in the workshops held at the Faculty, teachers participate in other workshops too, e.g. in 2017 three teachers of the Faculty participated in the workshop organized by the Agency for Science and Higher Education for higher education teachers on competitive approach to curriculum design. Also, the teachers have the University e-Portal UPraVO, on-line support in curriculum design and development, selection of teaching methods, determination of learning outcomes and self-assessment at their disposal

- <http://www.unizg.hr/studiji-i-studiranje/cjelozivotno-obrazovanje-i-usavrsavanje/podrska-nastavnicima/ucenje-i-poucavanje-u-visokom-obrazovanju-upravo/>.

In 2017 for the purpose of developing the language proficiency for teaching in a foreign language one teacher received the training and completed the course „Academic Teaching Excellence – English as the Medium of Instruction“, organized by the British Council.

Further, the Faculty's e-Learning Committee provides support to the teachers to design and further develop their e-courses.

The Faculty encourages the assessment and improvement of teaching competencies, hence the *Teaching Assessment Procedure*,

- https://www.fsb.unizg.hr/atlantis/web/sites/fsbonline/content/dokumenti/POKva_SOK/Vrjednovanje%20nastavnog%20rada_FV.pdf,

was adopted by the Faculty Council (21 April 2015), whereby criteria have been established for the assessment of teaching based on the student satisfaction surveys and other methods of assessment. The teaching activities of the teachers are assessed by the student satisfaction surveys. The assessment of teaching quality carried out by the University in the form of student paper-and-pencil questionnaires takes place triannually, and the student on-line faculty survey is carried out every year. The reports on the results of the university questionnaire are published on the website of the Faculty

- https://www.fsb.unizg.hr/?sustav_osiguravanja_kvalitete.

When teachers are appointed or re-appointed to a research and teaching position or to a teaching position they need to file also the results of the student survey i.e. how their teaching was assessed by the students. Prior to the first appointment to the research and teaching position of an assistant professor, the candidate is to deliver a public lecture for students, peer teachers and a committee comprising three teachers (one teacher comes from some other faculty) who assess the teaching competencies of the candidate.

Each academic year the Faculty gives awards for the best e-learning course, and contests with a fund for developing e-learning courses take place with the aim of encouraging more teachers to design e-learning courses thus further developing the e-learning process at the Faculty. The teachers who have already developed their e-learning courses also take part in the University contest for the best e-course; on the occasion of the 5th e-Learning Day at the University of Zagreb the teachers of the Faculty M. Štorga and S. Škec were honoured with an award for the best e-course in the academic year 2012-2013 for their course in Design Theory.

The Faculty also awards honours (Faculty Gold Medal, Faculty Medal or Faculty Recognition Award) to the teachers and other members of the staff on the occasion of the Faculty Day. The Faculty Gold Medal is awarded for exceptional contribution to the improvement of work, and the development and promotion of the Faculty. The Faculty Medal is awarded for special contribution to the improvement of work, and development and promotion of the Faculty,

- https://www.fsb.unizg.hr/atlantis/upload/newsboard/18_11_2013_19837_Prav_o_dodj_med_pro_cisc_2013_s_izmjenama.pdf.

The Faculty is aware of the fact that the existing measures are insufficient to motivate teachers, therefore new Award Regulations and Regulations on Conditions and Criteria for the appraisal of staff successful performance are being made, that should enable the assessing, awarding and motivating of the teachers holding teaching and research positions in a more thorough manner.

The Faculty has internal contests for teachers who apply for a higher research and teaching rank, in which research excellence is the selection criterion for shortlisting the candidates; such internal contests are seen as a good way of motivating teachers to increase their research productivity. Also, every year the Faculty allocates funds, the so called university financial support, for projects carried out by research and teaching staff and research assistants, ranking them by their research productivity.

The Faculty, and the Project Administration and Mobility Office in particular, encourage the international collaboration by providing support in the application and administration of projects, by supporting the

researchers and teachers of the Faculty who visit foreign universities and institutes as well as visiting scientists to the Faculty, and by supporting the realization of joint PhD thesis supervision with the aim of facilitating the networking between academics and increasing the Faculty's research. The Faculty has been accredited by the Croatian Ministry of Science and Education to host foreign researchers who work on research projects. A copy of accreditation is available at

- https://www.fsb.unizg.hr/index.php?uzms&strani_istrzivac.

The Faculty has a long tradition of encouraging mobility of its teaching and non-teaching staff, which is financed from a variety of sources, e.g. multilateral and bilateral scholarships, projects carried out by the host institution or projects carried out at the Faculty. The international mobility is mostly short-term and related to research activities and professional development. The Faculty has been participating in the Erasmus exchange programme including the mobility of students, teaching and non-teaching staff since the academic year 2009-2010. The teachers and research assistants participate in short stay programmes of professional training or teaching programmes for a period of up to one week. The Project Administration and Mobility Office provides support to the mobility of teaching and non-teaching staff by giving advice and making information available at https://www.fsb.unizg.hr/index.php?uzms&strani_istrzivac, and by participating in the announcement and realization of competitions for mobility. The teaching and non-teaching staff has used the opportunity of mobility in the programmes Erasmus +, Erasmus Mundus, Ceepus, Euraxess, and academic mobility (Tables 4.5 and 4.6). In addition to the mobility within these programmes presented in the MOZVAG tables, the teachers and research assistants participate in the mobility within other projects and funds as well (e.g. Fulbright scholarships), joint research and joint PhD thesis supervision; in total in the last five years there have been 25 researchers participating in mobility for a period longer than 3 months, 5 teachers, 27 professionals and 59 researchers participating in mobility for a period shorter than 3 months, all approved by the Faculty Council.

The Project Administration and Mobility Office regularly supplies information to the staff on competitions for mobility of teaching and non-teaching staff, organizes the international exchange of teaching and non-teaching staff, collaborates with corresponding offices of the University, agencies and ministries that are involved in the realization of mobility, and organizes workshops, seminars and other events related to providing information to the Faculty staff. The Office makes the information available in two languages (Croatian and English) on the website of the Faculty, <https://www.fsb.unizg.hr/index.php?uzms&home>. Mobility requires agreements to be signed by the Faculty and foreign institutions and the Office keeps records of foreign universities the Faculty has signed agreements with. The list of these universities is also available to the staff on the website of the Faculty and the following links:

- <https://www.fsb.unizg.hr/index.php?uzms&sporazum> and
- https://www.fsb.unizg.hr/index.php?uzms&ostali_sporazumi.

Also, the International Relations Office of the University of Zagreb,

- <http://www.unizg.hr/suradnja/medunarodna-razmjena/razmjena-sveucilisnih-djelatnika/>

provides organizational support to university teachers in relation to mobility who collaborate with colleagues at partner universities. Mobility is based on bilateral agreements with partner universities, and mostly includes short stays abroad with the quotas agreed upon for each calendar year. The University of Zagreb encourages the teachers to deliver lectures at foreign universities within the exchange programmes and to take the opportunity to discuss the ways of improving teaching at all levels of study. Exchange can also be realized based on existing contacts or the International Relations Office of the University may help in the search for academic partners abroad.

Mobility of teaching assistants who are postgraduate doctoral students is also awarded with ECTS credits for each exchange related to the research for the doctoral thesis, and the assessment is specified by the Regulations on doctoral studies and curriculum of the doctoral study programme,

- www.fsb.unizg.hr/atlantis/upload/newsboard/06_10_2014_21621_Pravilnik_o_doktorskom_studiju_Strojarstvo_brodogradnja_zrakoplovstvo_metalurgija.pdf,
- https://www.fsb.unizg.hr/index.php?poslijediplomski_doktorski_studij.

Also, a Doctoral Student Research Fund has been established to encourage PhD students to participate in the exchange programmes,

- https://www.fsb.unizg.hr/atlantis/web/sites/poslijediplomski_studij/content/Kompetitivni%20fondovi%20doktorskog%20studija.pdf,

which is used to finance visits longer than one month, participation in conferences and experimental investigations. An incentive to participate in mobility are also the requirements of the Rectors' Council,

- https://narodne-novine.nn.hr/clanci/sluzbeni/2006_09_106_2376.html,

as mobility is one of the requirements for appointment of academic staff. During their stays abroad both teaching and non-teaching staff are on paid leave.

The Faculty encourages also other forms of international collaboration, such as hosting international lecturers and organization of international conferences. In the case of hosting international lecturers the Project Administration and Mobility Office provides full administrative support, such as sending invitation letters, issuing letters of guarantee and certificates of stay and paying fees.

Under the Statutes,

- www.fsb.unizg.hr/atlantis/upload/newsboard/18_09_2017_27541_Statut_FSB_travanj_2017.pdf,

teachers holding the rank of an associate professor and full professor are entitled to a sabbatical leave lasting one year. In spite of this paid leave, in the last five years only three teachers have taken a sabbatical. When a teacher takes a sabbatical year, his/her teaching hours have to be delivered by someone. In such cases, relying on solidarity is a common practice, however, organizational problems occur in small chairs where there is no substitute teacher. It is a common practice to encourage young researchers to participate in international summer schools and workshops, international conferences and to stay at foreign universities for the purpose of professional development, but in such cases small chairs have the same problem of delivery of classes the respective young researchers were responsible for.

The Faculty's Project Administration and Mobility Office provides expert and administrative support in relation to Croatian and international competitions for research and innovation projects and technology transfer projects. The invitations to participate in competitions are always available on the website of the Faculty, newsletters are sent and, if necessary, workshops are organized to provide information on how to apply. In the first ten months of 2017, with the support of the Office 66 project proposals were sent.

4.5. The space, equipment and the entire infrastructure (laboratories, IT services, work facilities etc.) are appropriate for the delivery of study programmes, ensuring the achievement of the intended learning outcomes and the implementation of scientific/artistic activity.

The higher education institution plans and improves the infrastructure development, in line with the strategic goals.

The space, equipment and the entire infrastructure (laboratories, IT services, work facilities etc.) are appropriate for the delivery of study programmes and ensuring the achievement of the intended learning outcomes.

The space, equipment and the entire infrastructure (laboratories, IT services, work facilities etc.) are appropriate for the implementation of scientific/artistic and professional activities.

The Faculty performs its activities in three buildings at three locations: Ivana Lučića 5 (south building), Ivana Lučića bb (east building) and Ivana Lučića 1 (north building) with a total surface area of 33,962.24 m². The south (central) building was built in 1966, the north building in 1960, and the east building in 1968. Rational and efficient space and equipment management represents one of the important Faculty's strategic goals.

Over the years, considerable efforts have been made to improve and modernize facilities in terms of setting up an IT network, new carpentry (north building), partial air conditioning, laboratory space design and equipping, heating rehabilitation, the partial improvements of infrastructure objects and similar.

The Faculty facilities meet the size and layout requirements. The available lecture halls and laboratories match the number of enrolled students (at present 2363 undergraduate, graduate and postgraduate students) and meet the teaching and research needs of the Faculty. Teaching is delivered in 69 lecture halls with 2388 seats and a total area of 4930.14 m², and in 51 laboratories with a total area of 7021.52 m², representing an average of about 5 m² of lecture halls and laboratories per student. Lecture theatres and classrooms suit both smaller and larger student groups. It should be noted that there are differences in the level of laboratory equipment. Teaching, scientific-research work and collaboration with industry and technology transfers are carried out in laboratories. The IT classrooms are well-equipped and meet all the needs of students and teachers. The Faculty Library has a rich collection of books and journals, Internet workstations, and air-conditioned space to ensure a pleasant working environment.

The Student Canteen, located in the Faculty's building, was refurbished at the Faculty's expense in 2005 and fully meets its purpose.

A lot of attention has been paid to physical education and student sports activities. The Faculty rents spaces in various sports facilities (sports halls, swimming pools, tennis and badminton courts, fitness and gym facilities, rowing trails, ice rink etc.) where students have the opportunity and obligation to engage in different sports. Within the existing budget, no funds for premises rental have been allocated either by the Ministry or the University.

The premises intended for the project activities of students associations, Teachers Club and Alumni Club have recently been renovated.

In view of the nature of teaching at the Faculty, the IT equipment is of crucial importance for all teaching activities. Most of the resources for students are good, including the IT equipment and a virtual learning environment that provides access to data, course materials and electronic journals. There are more than 400 personal computers at the Faculty installed in IT classrooms. Upon enrolment, every student receives an electronic identity i.e. a user account that enables the access to LDAP data base available to students for studying purposes, to connect to the Wireless Network of the Faculty, to connect via the VIP CARNet Broadband connection, to use network applications (e.g. remote learning system or scientific bibliography) and similar. LDAP directory of the fsb.hr domain is part of the AAI@EduHr infrastructure. The instructions on

login to access computers in the PC classrooms are clearly outlined and made available on the Faculty's web pages.

Most of the equipment is available to students out of teaching time (8 a.m. to 8 p.m. when rooms are not occupied for teaching), which is necessary for their independent work related to seminar papers, project assignments and undergraduate and graduate thesis. The equipment may also be available on days when the Faculty is officially closed upon permission of the Faculty Management, if necessary for the completion of thesis with a tight submission deadline (graduation theses).

In parallel with the IT equipment provision it should be pointed to the issue of special software packages procurement and licensing as these programs are largely financed by the Faculty's own funds.

There are 268 offices available for 291 teachers and associates at the Faculty of the average surface area of 17 m². All offices have adequate power and Internet connections, as well as a personal computer. A number of offices are equipped with air conditioning. Offices are suitable for performing research and teaching activities. A large number of offices is not suitable for teaching a large group of students, but allow for individual work or work in smaller groups.

The Faculty has no specialized laboratories intended exclusively for research activities. The Faculty has six accredited laboratories: Applied Thermodynamics Laboratory, Welding Laboratory, Machine Element Laboratory, Process Measurement Laboratory, Precision Length Measurement Laboratory and Mechanical Testing Laboratory. The named laboratories are holders of the Croatian national standards and have special rooms for the development of the primary standards (in line with the strict requirements of ISO/IEC17025). Occasionally, these rooms are also used for preparing undergraduate, graduate and doctoral theses.

There is no space at the Faculty that is used solely for professional work related to the collaboration with industry. Professional work is an integral part of the teaching and research process, since it is carried out with the same equipment and in the same space used for teaching or research. Professional work features very often a less complex part of the initial research, whose ultimate outcome are the basic results serving as the basis for further research. Furthermore, students' work, especially involving the preparation of undergraduate and graduate theses, often refers to a solution to some of the simpler problems that are part of a larger unit of a professional work.

MOZVAG Table 4.9 shows only items of capital equipment whose purchase value exceeds HRK 200,000.00. It is important to note a significant value of the equipment procured subsequently (e.g. new computer components or measuring devices were purchased, several machines and devices upgraded). These items of equipment are recorded in the lists as separate components, and since their real and useful value significantly exceeds the value of individual components it can be considered capital equipment.

Over the last four years six IPA and EFRR projects from the Structural Funds have been carried out at the Faculty (totalling approx. 3.7 million Euro), whereby the state-of-the-art, valuable equipment was procured and laboratory space provided for teaching, scientific and professional work. The project "Centre of Excellence for Structural Health Analysis (CEEStructHealth)" has provided a newly equipped computer classroom with 21 PCs, servers, a workstation, a smart board and new software packages: ABAQUS, ANSYS, ZENCRACK, FE-SAFE (<http://www.ceestructhealth.eu/en/>).

The project "Advanced Research, Innovation and Technology Transfer in Surface Engineering (ARISE)" (<http://www.arise.com.hr/o-arise-u/>) enabled the modernization of the Laboratory for Thermal Treatment and Surface Engineering as well as development of technical infrastructure in surface engineering for the research and application of advanced coatings produced by the advanced PACVD technology (Plasma Assisted Chemical Vapour Deposition).

The project "Research and Promotion of Shallow Geothermal Potentials in the Republic of Croatia (GeoMapping)" enabled the procurement of the TRT device for testing soil thermal properties, temperature measurement device with fibre-optic cables and geothermal heat pump. Furthermore, the research on the regional properties of shallow geothermal potentials of soil in the territory of the Republic of Croatia was

carried out and the findings and knowledge about geothermal heat pump technology related to ground source heat as a renewable energy source was disseminated

- http://geothermalmapping.fsb.hr/?page_id=8.

As part of the project "Additive technologies for small and medium sized enterprises (AdTec SME)" the Centre of Additive Technologies was established at the Faculty aiming to become a leading centre for research, development and application of additive technologies, by linking science and economy

- <http://adtec.cateh.eu/home.html>.

The project "Robotic Neuronavigation (RONNA)" enabled the procurement of equipment and carrying out of research aiming to design a novel robotic neuronavigation system for commercial use

- http://www.ronna-eu.fsb.hr/index.php?option=com_content&view=featured&Itemid=106&lang=hr.

In addition to the laboratory equipment procurement, the project "Capacity building for the development and calibration of optical and x-ray vision systems (IKARUS)" enabled the increase in academic and entrepreneurial capacities by providing all production quality control segments with the modern measurement methods based on the vision and x-ray systems (http://www.fsb-ikarus.eu/?page_id=237).

The project launched in September 2017, "National Reference Laboratory for Emissions from IC Engines for Non-Road Mobile Machinery", (<https://nrle.fsb.hr/>) is both the most valuable FAMENA project and the first FAMENA infrastructural project that has been awarded the grant from the European Structural and Investment Funds. Moreover, two infrastructural projects funded by the European Fund for Regional Development within the scope of the operational programme Competitiveness and Cohesion are expected to be launched, in particular "Regional Centre of Excellence for Robotics Technology (CRTA)"

- https://www.fsb.unizg.hr/atlantis/upload/newsboard/26_10_2015_23826_Obavijest_o_potpisu_ugovora_CRTA.pdf

and "Equipping the Regional Centre for Laboratory Research in Hydromechanics (ORCHID)"

- <https://www.fsb.unizg.hr/orchid/>.

4.6. The library and library equipment, including the access to additional resources, ensure the availability of literature and other resources necessary for a high-quality study, research and teaching..

The library and library equipment, including the additional resources, meet the conditions for a high quality of study.

The library and library equipment, including the additional resources, ensure a high quality of scientific-teaching / artistic-teaching activities.

The Faculty Library (<https://knjiznica.fsb.hr>) is an academic library whose primary purpose is to serve the Faculty's educational and research goals providing IT and communication support through its collections of various resources and services. Although primarily intended for the use of employees and students of the Faculty, an open access is also granted to all external users in search of specific literature or any information related to the fields of mechanical engineering, naval architecture and aeronautical engineering. The status, organization, management and operation of the Library are regulated by the FAMENA Library Regulations

- www.fsb.unizg.hr/atlantis/upload/newsboard/06_10_2014_21622_Pravil_o_radu_Knjizn_usvojen.pdf.

The Library opening hours are Monday to Friday from 8:00 a.m. to 4:00 p.m., whereas two library reading rooms are open to students Monday to Saturday from 8:00 a.m. to 9 p.m. The Faculty Library is located on the upper ground floor of the south Faculty building and easily accessible to students and other users.

With its total floor area of about 600 m², the Library features the workspace for library staff, reference classrooms, two student reading rooms and the shelving storage of library's holdings.

The reference classroom is intended for individual work, it covers the area of 150 m² and features 40 seats, 16 of which are equipped with computers and Internet access. In the reference reading room, students have an open access to all literature and textbooks required for their studies. The library shelves in the reference reading room meet the standards and needs by enabling easy access to library's holdings. Two additional reading rooms with the total area of 150 m² with about 100 seats are also available to students. Reference reading room and student reading rooms are air-conditioned, providing students with a pleasant working environment.

The Faculty Library has a rich collection of about 51,000 book and 400 journal titles. Part of the collection is located at the various departments (about 25,000 books). The entire library's operation is based on the Aleph integrated library system (library materials processing, borrowing, procurement...). The Library regularly procures obligatory and optional literature, and all other titles that are of interest to students and teachers. It also regularly performs audits and depreciates the library holdings.

In addition to standard reference literature (dictionaries, encyclopaedias, manuals, lexicons...), most of the library's holdings comprises scientific and professional publications which cover the broader field of technical science; in particular the scientific fields of mechanical engineering, naval architecture and aeronautical engineering. Moreover, professional literature and examination materials in other fields included in the Faculty's study programmes (mathematics, physics, chemistry, marketing, environmental studies, foreign languages) are also available for loan. The oldest book in the Library dates from 1673.

The detailed descriptions of course subjects list obligatory and supplementary course materials including about 700 book titles and manuals used in teaching (about 400 mandatory and 300 supplementary titles). There are about 9,000 copies of obligatory and supplementary titles (books) available. One part of these books and manuals has been written by Faculty's academic staff, and the other refers either to translations of foreign titles or materials in foreign languages.

Through continuous acquisition of new professional and scientific literature, the library's collection has been kept up to date. Each year, the Library is allocated HRK 80,000.00 by the Faculty to add the most recent titles and other materials to its collection in line with the students' needs. Furthermore, to meet the needs of the

academic staff, the library materials are procured by using project funds and funds allocated by the Faculty to the departments and chairs for teaching purposes.

Each year, the Library renews subscriptions to Croatian and international professional and scientific journals relevant in the field of mechanical engineering, naval architecture and aeronautical engineering. Through consortium agreements, the Ministry of Science and Education provides scientific institutions with access to a number of databases (56), both bibliographic and full text databases, such as Current Contents, Web of Science, Science Direct, Ebsco, Springer Link, etc. The University of Zagreb subscribes to full text databases (10 databases with full texts from major journal publishers) enabling teachers and students of the Faculty to access thousands of journals, part of which covers the areas studied at the Faculty. At the Library, users can always get help with browsing the databases and searching for relevant information sources.

The high level of the Faculty Library computerisation is continually being improved and perfected. It is worth noting that the Faculty Library was the first one in Croatia to launch a digital theses repository, which, besides master's theses and doctoral dissertations, also includes undergraduate and graduate theses. As of 2015 the digital theses repository has been expanded to include other types of works (articles, studies...)

- <http://repozitorij.fsb.hr/>.

The Library's holdings have been computerised and can be browsed through an online catalogue.

- <http://katalog.fsb.hr/>.

The Faculty Library employs four professional staff members: the Head of Library holding the rank of Library Advisor (PhD), two graduate librarians (MA in Library Science) and a librarian/professional associate. Library staff has access to in-service training through various domestic and international conferences and symposia, as well as through various workshops. The Faculty Management provides support by covering the tuition fees and programme costs for PhD studies of the Library staff. Currently, one of the graduate librarians is in the second year of PhD in Information Sciences.

4.7. The higher education institution rationally manages its financial resources.

Financial sustainability and efficiency is evident in all aspects of the higher education institution's activity.

HEI manages its financial resources transparently, efficiently and appropriately.

Additional sources of funding are used for institutional development and improvement.

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

The Faculty's revenues are generated from a variety of sources and recorded accordingly. Their trends are monitored across these different sources.

In 2015 the total revenues of the Faculty amounted to HRK 92,515,053.00. The largest portion of the Faculty revenues came from the budget (revenues from the state budget increased by the revenues from the budget of other public sources) and amounted to HRK 62,625,897.00 or 68%. Salaries took up 85%, scientific projects 3%, material costs 6% and the revenues from tuition subsidy under the government tuition subsidies funded by the Ministry of Science and Education accounted for 5% of the revenues from the budget.

Operating revenues and income generated under special regulations (tuition fees) amounted to HRK 29,627,213.00, out of which tuition subsidies amounted to HRK 3,565,556.00 and made up 12% of the trading revenues. The revenues from business activity involved in market transactions (trading revenues), pertaining to and generated from operating activities and under special regulations (tuition subsidies), made up 32% of the total revenues. Cooperation with industry, international projects and rental income from leases accounted for 85% of the structure of trading revenues.

The level of autonomy and flexibility of financial management is determined by the ratio of budget revenues to trading revenues. In order to increase the level of autonomy and flexibility of the Faculty financial operation, it was necessary to make more effort to increase the share of own-source revenue in the total revenues.

Approximately 12% of the own-source revenues were generated from tuition fees, including tuition fees for undergraduate, graduate, postgraduate specialist studies and postgraduate doctoral studies, as well as from other revenues related to student enrolment. Approximately 31% of own-source revenues referred to scientific, technology and international projects, 7% of revenues were earned from leases, and the largest portion of own-source revenues, 39%, came from collaboration projects with industry. The specified structure of own-source revenues was considered satisfactory, but more effort should be made to increase the revenues, in particular those generated from international projects, revenues from commercial projects and from other forms of collaboration with industry.

The other trading revenue sources included receipts from donations that made up 10% of own-source revenues and financial income that in 2015 amounted to HRK 791,378.00.

In 2016 the total revenues of the Faculty amounted to HRK 96,311,221.00. The largest portion of the Faculty revenues came from the budget (revenues from the state budget increased by the revenues from the budget of other public sources) and amounted to HRK 67,274,649.00 or 70%. Salaries took up 74%, scientific projects 7%, material costs 11% and revenues from tuition subsidy under the government tuition subsidies funding of the Ministry of Science and Education made up 7% of the revenues from the state budget.

Revenues from business activity involved in market transactions (trading revenues), generated from operating activities and under special regulations (tuition subsidies), made up 29% of the total revenues. Cooperation with industry, international projects and leases accounted for 87% of the structure of trading revenues.

About 13% of own-source revenues were generated from tuition fees, including tuition fees for undergraduate, graduate, postgraduate specialist studies and postgraduate doctoral studies, as well as from other revenues related to student enrolment. Approximately 29% of own-source revenues referred to scientific, technology and international projects, 8% of revenues were earned from leases, and the largest

portion of own-source revenues, 43%, came from collaboration projects with industry. The specified structure of own-source revenues was considered satisfactory, but more effort should be made to increase the revenues, in particular those generated from international projects and collaboration with industry.

As regards the structure of trading revenues, revenues from operating activities amounted to HRK 24,621,045.00 and made up 87% of the market revenues, whereas revenues generated under special regulations (tuition subsidies) amounted to HRK 3,684,235.00 and made up 13% of the market revenues.

The other trading revenue sources included receipts from donations that made up 7% of own-source revenues and financial income that in 2016 amounted to HRK 79,342.00.

In 2015 the total expenditure of the Faculty amounted to HRK 95,003,125.00. Staff costs amounted to HRK 60,780,411.00 (64% of total expenditure), material and energy costs totalled HRK 6,826,085.00 representing 7% of total expenditure, cost of services amounted to HRK 13,437,375.00 or 14% of total expenditure.

Costs for the procurement of nonfinancial assets amounted to HRK 7,150,864.00 or 7%.

The major portion of expenses accounting for 60% of total expenditure was covered from the budget (source of finance – category 11: General revenues and receipts), whereas 40% was covered from the other (own) sources of finance.

In 2016 the total expenditure of the Faculty amounted to HRK 96,488,850.00. Staff costs amounted to HRK 60,427,703.00 or 63% of total expenditure, material and energy costs totalled HRK 6,014,523.00 representing 6% of total expenditure, cost of services amounted to HRK 14,362,516.00 or 15% of total expenditure. Costs for the procurement of nonfinancial assets amounted in 2016 to HRK 6,429,660.00 or 7%.

The major portion of expenses accounting for 64% of total expenditure was covered from the budget, whereas 36% was covered from the other (own) sources of finance.

Other sources of finance include: own-source revenues (collaboration with industry, rental income from leases, conferences, seminars); assigned revenues (revenues under special regulations – tuition subsidies); grants (international projects) and donations.

Revenues from tuition subsidies are used to improve teaching quality through different activities such as field work, part-time teaching, student assistance, support for the activities of students associations at the Faculty and similar.

In accordance with the Dean's decision dated 25th October 2016 (Class: 400-01/16-23/8; File No: 251-66-1700-16-2), adopted by the Faculty Council at its meeting held on 18th October 2016, the allocation of revenues from collaboration with industry, research and professional projects and programmes was agreed on, referring to the following categories:

- T0 = value added tax
- T1 = Faculty funds – overhead costs as per service type/project;
- T2 = laboratory/chair funds for operation improvement
- T3 = at the researcher-project manager's disposal.

In the event of increased budget financing, the priority investments are: the modernization of equipment in teaching spaces, the establishment of new and upgrading of existing laboratory facilities, training courses for the teaching and non-teaching staff, maintenance of buildings, the Faculty's promotional activities, the improvement of the quality system management of teaching; long-term investment in equipment and infrastructure, construction and equipping of new premises that would facilitate further upgrading of the teaching process to suit the current trends (e.g. space for students independent work on practical projects) and the procurement of the equipment that due to its price is not available to the Faculty today, but would open up new areas of research and work – European funds for science and research also play an important role here.

Higher education institution ensures financial sustainability in accordance with its mission. Sources of finance and all matters related to funding are transparent.

V

Scientific activity

5.1. Teachers and associates employed at the higher education institutions are committed to the achievement of high quality and quantity of scientific research.

Teachers and associates publish an appropriate number of high-quality scientific publications.

The higher education institution has efficient procedures for encouraging high-quality scientific publication.

The higher education institution keeps record of publication (publication index, citations impact, h-index, if applicable).

HEI's scientific/artistic activity is evident in PhD theses.

Teachers and associates of the higher education institution actively promote scientific/artistic achievement at national and international conferences.

In the period from 2012 to 2016 teachers at the Faculty of Mechanical Engineering and Naval Architecture have published 620 scientific papers in journals included in WoSCC (Web of Science Core Collection, category A) which makes 5.1 papers per teacher (1.02 annually) and 1,256 other papers (according to the Ordinance on Appointment to Scientific Gradespapers), which makes 9.85 papers per teacher (1.96 annually). (Table 5.1. Analytical attachment to Self-evaluation)

There is a noticeable increase in the number of published papers per year when analysed according to the years of publishing.

According to the Web of Science, current total number of citations of publications is 5,862, i.e. 10,977 in SCOPUS database. Total h-index of higher education institution is 30 according to the Web of Science, or 40 in SCOPUS database. (Table 5.1. Analytical attachment to Self-evaluation)

According to data reported by the Rector of the University of Zagreb, out of all higher education institutions in the field of Technical Sciences, the higher education institution has the highest number of papers indexed in the Web of Science, and after the Faculty of Medicine, it has the largest number of papers among all higher education institutions.

The Faculty Council adopted the Parameters for Evaluation of Scientific Research Work in 2015. The evaluation is divided in three categories: scientific excellence, international recognition and scientific projects.

The parameters for scientific excellence include: the quantity of scientific papers (number of papers in journals and proceedings), the quality of scientific papers (impact factor and quartile in category) and the number of patents realized in the country and abroad. International recognition is evaluated according to the citation impact h-index, number of invited lectures, editorials and reviewing the papers in journals, membership in conference programme boards and functions in international scientific organisations. Parameters for scientific projects include conducting and participating in scientific projects.

These evaluation parameters are integral part of so called table of achievements that along with other documents are considered by the Human Resources Committee when drafting proposals for academic advancement.

Distribution of annual university grants for research is based on the list of teachers and associates ranked according to the number of published high quality papers in the last five years. The Faculty nominates its most successful researchers for prestigious national awards (e.g. state awards for science, awards of the Croatian Academy of Sciences and Arts (HAZU) and the Croatian Academy of Engineering (HATZ), award of the Ministry of Science and Education Ivan Filipović, university award Fran Bošnjaković).

By decree of the Dean of 10 November 2015 on the obligation to store scientific, professional and popular papers in the Croatian Scientific Bibliography (CROSBİ) and in the [Repository of the Faculty of Mechanical Engineering and Naval Architecture](#), employees enter their work in these databases and these data with the data published in the Web of Science databases and SCOPUS represent the basis for monitoring the quality

and quantity of dissemination of the results of scientific and professional research. The Faculty's scientific productivity analysis is one of the points of the Dean and Vice Dean's annual reports regarding the work of the past academic year.

The analysis comprises number and type of projects, number of published scientific papers in journals and conference proceedings. In particular, the report highlights data on conferences and workshops organized by the Faculty's employees.

The website of the Faculty has a link to the CROSB database which enables ranking of the Faculty members according to all categories of papers that exist in the database.

According to the Dean's decision, the Google Scholar account was created as the prerequisite for obtaining the university grant for scientific research which enables the visibility of scientific production of the Faculty's members.

From the academic year 2014/2015 the Faculty of Mechanical Engineering and Naval Architecture implements new [Postgraduate doctoral study in mechanical engineering, naval architecture, aeronautical engineering and metallurgy](#). The study was organized and conducted by two components of the University of Zagreb, the Faculty of Mechanical Engineering and Naval Architecture along with the Faculty of Metallurgy in Sisak. The postgraduate doctoral study of the Faculty qualifies students for scientific work in the field of technical sciences: mechanical engineering, naval architecture, aeronautical engineering, rocket and aerospace engineering, metallurgy and fundamental engineering sciences.

In addition to scientific education, this study aims to strengthen the link between doctoral studies and industry and increase the number of awarded PhD degrees in the industry with the aim to help the development of knowledge-based industry.

Doctoral study at the Faculty of Mechanical Engineering and Naval Architecture and the Faculty of Metallurgy in Sisak is fully aligned with the University of Zagreb Research Strategy. Moreover, with predominantly research discretion and emphasized international orientation of subjects and teaching contents, the postgraduate doctoral study promotes the strategic objectives of the University of Zagreb, both in terms of fulfilling the basic strategic objective of the Research Strategy and the immediate goals set out in the strategic document.

The doctoral candidate may [collect ECTS credits](#) by publishing papers in high quality journals thus encouraging the publication of research. Before defending his/her dissertation, the doctoral student shall have one publication related to the doctoral research published in a journal that is at least Q3 in the required field, that is, paper that brings at least 20 ECTS credits.

In the period from 2012 to 2016, the Faculty's teachers published 975 reviewed scientific papers in scientific and professional proceedings (1.53 papers per teacher per year) (Table 5.1. Analytical attachment to Self-evaluation).

The teachers also participated in the work of the organizing committee of 82 scientific and professional conferences (Table 5.4. Analytical attachment to Self-evaluation), mostly in cooperation with professional organisations that have their headquarters at the Faculty and whose leading functions are the staff of the Faculty.

5.2. The higher education institution provides evidence for the social relevance of its scientific, artistic, professional research and transfer of knowledge

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

The higher education institution has an efficient support system for research and transfer of knowledge and technologies.

Teachers and associates participate in activities of scientific, arts and professional organisations.

In order to enhance the cooperation with the industry, the Economic Council was constituted as the Dean's advisory body in March 2015. It comprises 18 members from the industry and four members from the Faculty of Mechanical Engineering and Naval Architecture. The cooperation in various fields is expected: on development and highly professional projects, in curriculum development, industrial practices, scholarships, etc.

The Faculty is the founder of the [Centre for Technology Transfer](#), a limited liability company (acronym: CTT) in 1996. The primary goals and tasks of the Centre are: improving technological process in the Republic of Croatia for the needs of mechanical engineering and naval architecture, linking science and technology with the industry, launching innovative projects with the goal of sustainable development, lifelong training of experts from the industry with an aim to successfully transfer technological processes and increase the competitiveness of the domestic industry.

Moreover, the Faculty staff cooperates with the industry and other components of the University to establish several Competence Centres: Competence Centre for Advanced Materials, Aluminum Competence Centre, Competence Centre for Advanced Energy Management in buildings and infrastructure, Competence Centre of Quality Improvement in Shipbuilding Industry, Competence Centre for Advanced Mobility and Competence Centre for Advanced Power Equipment.

The Croatian Association of Engineers of the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb ([AMAC FSB](#)), headquartered at the Faculty and with the faculty members in charge, also provides useful information on the needs of the company and the labour market. The Association comprises 77 members and one of the goals is building and strengthening the links and cooperation between the Faculty and similar educational, development and research institutions in the country and abroad. A small number of members can be explained by the fact that the new statute of the Association that is in line with the Law on Association was adopted at the end of 2016, and new information about members were required for formal membership, which were not known at that time. The number of members before that was 330.

The Faculty's social engagement is shown in projects of Human Resources Development of the European Social Fund (ESF). Two such projects have been completed (The Influence of Innovative Energy-Efficient Technologies on Greenhouse Gas Emissions from Ships and Material Engineering – the foundation of an innovative economy).

Four projects are in the application process: Support for the development of partnerships between civil society organizations and higher education institutions for the implementation of socially useful learning programs (Protect the Adriatic Environment – SPOJ (Eko Kvarner Association), Participation in the preservation of the Maritime Heritage (Association for Promotion and Interaction in Culture and Education INTERACTA), Toward the energy independence of the island by socially useful learning (Association Novi otok), Educating students to apply the acquired knowledge of needs and services in the local community through the implementation of socially useful learning (DKU) and the project Improving literacy – a foundation for lifelong learning (Development of Innovations in STEM area).

[Project Administration and Mobility Office](#) acts within the Faculty according to the Regulations on the Faculty's organisation and work places. The Office comprises 3 employers whose scope of work includes: the cooperation with the offices of the University in Zagreb, as well as agencies and ministries responsible for project implementation; announcement of tenders for financing research and development projects;

collection of project proposals; administrative monitoring of contracted projects; informing project leaders and their associates about the rules, procedures, and necessary documents needed for proper implementation of projects; assistance in drafting financial reports for projects and organizing the receipt and submission of project work reports.

The transfer of knowledge and technology to the industry takes place via the [Centre for Technology Transfer](#), which is visible from the very name itself.

The primary goal of the Centre is initiating projects that will link research resources of higher education institutions and research institutes with the industry in order to restructure, improve and support primarily small and medium-sized companies that are not capable to finance their own developmental staff but can play a significant role in achieving sustainable development and improvement of the economy of the Republic of Croatia.

CTT activities take place through three main areas:

- incubating knowledge-based companies and providing professional and organizational assistance to their development and operations (currently, 12 companies on the area of approximately 600 m² have been incubated. The number changes over the year depending on the activities of particular company thus some companies enter and some leave the space).
- life-long learning (seminars, professional meetings, courses for participants from the industry).
- projects for and in the cooperation with the industry.

Besides above mentioned activities conducted via CTT, the Faculty staff are also project leaders of few technological projects of Croatian Agency for SMEs, Innovations and Investments (HAMAG-BICRO). They are project leaders of three projects of Pre-seed Capital Program known as PoC. This program is intended for financing acceptable pre-commercial activities of innovative scientific-entrepreneurial projects in the initial phase of the development of new products, services and technological processes and leaders of Program for research and development (IRCRO) that encourages SMEs to cooperate with scientific institutions in order to start up and speed up their R&D activities.

One aspect of knowledge transfer is the postgraduate professional study program that lasts 5 academic years which annually enrolls 5-8 professionals from the industry, of which 1-6 completes the study.

The knowledge transfer to the industry is also encouraged on the Postgraduate doctoral study where students [gain ECTS credits](#) by working on development projects for the industry related to the doctoral theses.

There are 20 professional associations at the Faculty to which the presidents are mostly present or former teachers:

1. Croatian Association of Engineers of the Faculty of Mechanical Engineering and Naval Architecture, www.amac.fsb.hr
2. Centre for Non-destructive Testing, ceni.hr
3. Croatian Welding Society, www.fsb.unizg.hr/hdtz/
4. Croatian Society of Mechanics, www.csm.hr
5. Lean management initiative
6. The International Centre for Sustainable Development of Energy, Water and Environment Systems, , www.sdewes.org
7. Adria Section of the Combustion Institute, adriacombustioninstitute.org
8. Croatian Society of Mechanism and Machine Theory, www.fsb.unizg.hr/CroFToMM/
9. Zagreb Association of Secretaries and In-house Lawyers of the Higher Education System and Science
10. Croatian Society for Materials Protection, www.fsb.unizg.hr/hdzama/

11. Croatian Association for Thermal Treatment and Surface Engineering, www.hdtoip.hr
12. Croatian DAAD Club, www.fsb.unizg.hr/daad-klub/
13. Croatian Society for Machine Elements and Design, www.hdesk.fsb.hr
14. Society for Plastics and Rubber, www.fsb.unizg.hr/polimeri/
15. Croatian Association for Materials and Tribology (HDMT), www.hdmt.hr
16. FSB Nautical Club, www.fsb.unizg.hr/nauticki-klub/
17. Croatian Association of Production Engineering, www.fsb.unizg.hr/cim2007/
18. Centre for Innovations in Small Shipyards, www.fsb.unizg.hr/cimb/
19. Association of Refrigeration Systems and Heat Pumps, www.hurkt.hr
20. Croatian Association for Product Lifecycle Management

Members of the Faculty are members of organizational boards of numerous scientific and professional conferences organized by the mentioned associations, whereby the Faculty is often co-organizer.

The Faculty also continuously develops its own promotion system in order to maximize its presence in society as one of the most important components of the University. The aim is to present the results of activities to the public but, at the same time, to further integrate the Faculty into a social community.

In order for the public to get acquainted with the activities of the Faculty, Public Relations Committee acts as a permanent working body at the Faculty. The committee comprises 19 members (two of which are representatives of undergraduate and graduate study) with a term of two years.

The Committee is responsible for the organisation of public events at the Faculty, such as: Faculty Day, Student Vessel Regatta, University Student Summit and alike, and organisation of workshops and forums. Once a year, the Committee submits a report on its activities to the Dean, where the list of activities is a constituent part of the report (workshop, forums...).

5.3. Scientific /artistic achievements of the higher education institutions are recognized in the national and international context.

Teachers, associates and professional staff have received university, national and international awards for their scientific/ artistic achievements.

The higher education institution is a holder of an adequate number of scientific / artistic projects (university, national and international).

Teachers and associates participate as invited lecturers in an adequate number of national and international conferences.

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

Teachers of the Faculty of Mechanical Engineering and Naval Architecture have received 2 university, 6 national and 11 international awards or acknowledgments for their scientific achievements.

Research work at the Faculty of Mechanical Engineering and Naval Architecture is currently being conducted through international and domestic projects and university grants.

Since 2012, the Faculty of Mechanical Engineering and Naval Architecture has been the leader and a partner on 35 international projects supported from different funds: Framework Programme (FP7), Horizon 2020, Instrument for Pre-Accession Assistance (IPA), IPA Adriatic, EUREKA, Competitiveness and Innovation Programme – Intelligent Energy Europe (CIP IEE), MED, EMPIR, EMFF (EASME), EURAMET, NEWFELPRO/MZO, ERASMUS+ KA2, EFRR, INTERREG CENTRAL EU, INTERREG MED, ESF) and a leader of 10 bilateral and 16 domestic projects of the Croatian Science Foundation (Table 5.3.a Analytical attachment to Self-evaluation).

The Ministry of Science and Education stopped funding 47 scientific projects in 2013. Since then the University of Zagreb financially supports research and one development project. In the period from 2013 to 2016 many researches have been conducted on a total 115 grants, and such funding continues (in 2017, 40 grants). 63 new projects are underway.

Teachers and associates of the Faculty of Mechanical Engineering and Naval Architecture have held 12 invited lectures at national and 73 international conferences during the last 5 academic years.

In the last 5 years, teachers and associates of the Faculty of Mechanical Engineering and Naval Architecture were 199 times members of conferences scientific boards, while in the same period they worked as members of the editorial boards in 48 journals, of which in 6 journals they were appointed as editors-in-chief.

5.4. The scientific/artistic activity of the higher education institution is both sustainable and developmental.

The research arts/developmental strategy is aligned with the vision of the higher education institution.

Scientific/artistic activities are established by the strategic programme of the higher education institution.

HEI recognizes and rewards scientific /artistic achievements of its employees.

HEI continuously improves its scientific/artistic activities by appropriate financing, human resource management, investing in spatial resources, equipment and appropriate literature, supporting dissemination of results and development of doctoral theses.

The Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, aims to position itself as one of the leading institutions in the fields of mechanical engineering, naval architecture and aeronautical engineering in South Eastern Europe. Through research and teaching, it strives to occupy a crucial role in fostering the development and progress in Croatia's economy, based on innovations.

This **vision** was published in the [Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture University of Zagreb \(2014 – 2025\)](#) whereby Research and Innovation Strategy of the Faculty is one of four strategies published in the aforementioned strategic document.

Research and Innovation Strategy of the Faculty outlined 3 general objectives:

- Improve the research potential of the Faculty
- Improve the research influence of the Faculty on the economy
- Improve the international research visibility of the Faculty

For each general objective, several specific objectives are set out to achieve these general objectives

The Parameters for Evaluation of Scientific Research Work of Teachers were adopted by the Faculty Council at its 10th session held on 14 July 2015. The Committee still hasn't finalised the final proposal of ponders.

The Faculty is aware that the existing faculty reward systems are insufficient thus new Regulation on Rewarding is being drafted, which will thoroughly evaluate, reward and motivate the teachers' efforts in teaching, science and other activities.

The successful fulfilment of all objectives of the Strategy is implemented in accordance with the Action Plan adopted by the Strategy Committee, permanent Dean's body with the term of two years and appointed by the Faculty Council at the Dean's proposal.

The Strategy Committee adopted short-term action plan in line with the objectives of the Strategy with the intention to adopt the mid-term and long-term plan in the near future.

The monitoring of the implementation of the Strategy is partially included in an annual plan of activities for quality assurance of the Faculty in which defined method of implementation, expected results, deadlines and responsible persons and bodies participating in particular research activities are defined.

In order to fulfil the Strategy programme, new postgraduate doctoral study of the Faculty related to the scientific fields of mechanical engineering, naval architecture, aeronautical engineering, and metallurgy was launched in 2014, which is fully aligned with the Research and Innovation Strategy of the Faculty of Mechanical Engineering and Naval Architecture, part of the Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture University of Zagreb.

Evidence of compliance of doctoral study with the Strategy Program is presented in Chapter 4.2. [Self-analysis of Doctoral Study](#), made in the process of reaccreditation of the postgraduate university study.

The Faculty has 69 classrooms with 2388 seats and a total area of 4942m². Space conditions are satisfactory in terms of size and disposition. The number of classrooms and laboratories (the Faculty has 51 laboratories) corresponds to the number of enrolled students (at present, 2350 students including postgraduate studies) as well as to the teaching and research needs of the Faculty. In line with the level of equipment, laboratories are suitable for research purposes. Computer classrooms are well equipped and meet all the students' requirements. There is a computer cluster in the Computer Centre and servers designed for sophisticated calculations and numerical simulations.

The Faculty's library has a rich collection of books and journals. It is equipped with air-conditioning and computers where students can find study spaces conducive to academic work.

Detailed description of research resources available at the Faculty of Mechanical Engineering and Naval Architecture is shown in chapter 3.6. [Self-analysis of Doctoral Study](#) and in standard 4.5 of the self-analysis.

5.5. Scientific/artistic activities and achievements of the higher education institution improve the teaching process.

Equipment for scientific/artistic research is used in teaching at undergraduate, graduate and postgraduate level.

Undergraduate, graduate and postgraduate students are involved in scientific/artistic projects of the HEI.

Both teaching at the undergraduate and graduate levels, and doctoral theses reflect scientific/artistic research and achievements of the higher education institutions.

The teaching and research activities of higher education institution are closely connected.

There are 51 laboratories at the Faculty which are closely connected with teaching activities and act within the Departments and Chairs of the Faculty. Laboratory exercises are an integral part of the teaching process. In line with the level of equipment, laboratories are appropriate for research and teaching activities.

Computer classrooms are well equipped and meet all the students' requirements. There is a computer cluster in the Computer Centre and servers designed for sophisticated calculations and numerical simulations.

At the beginning of his or her studies, each PhD student is provided with a user account to access the LDAP database which he or she uses during studies for connection to the Faculty's wireless network, connection through VIP CARNet Broadband, CARNet modem entries, use of network applications (e.g. distance learning system or scientific bibliographies) etc. The LDAP directory of the fsb.hr domain is part of the AAI@EduHr infrastructure. There is a clear signing up procedure for accessing a computer account in PC classrooms published on the Faculty's website.

The Faculty's Library has a rich fund of books and magazines. It is equipped with air conditioning and computers and provides very good conditions for students to work. The Library is located in the high ground floor of the south building of the Faculty, which makes it easily accessible to students and outside visitors.

The Faculty of Mechanical Engineering and Naval Architecture Library is an academic library whose primary purpose is to serve the Faculty's educational and research goals providing IT and communication support through its collections of various resources and services. Although primarily intended for the use of students and the Faculty, an open access is granted to visitors in search of specific literature or information related to the fields of mechanical engineering, naval architecture and aeronautical engineering. The Library is open to students from 8 am to 6 pm from Monday to Friday, while two reading rooms are available from 8 am to 9 pm.

According to the requirements prescribed by the Croatian Rectors' Conference ([Official Gazette 106/2006](#) and [122/2017](#)) graduate and undergraduate theses advisors are motivated to jointly publish papers on undergraduate or graduate theses with their students.

Most Chairs of the higher education institution comprise a significant number of (mostly) graduate students, who together with teachers, are working on research. As a result, an unexpectedly high percentage (408 out of 2,744 or 15%) of students are also co-authors of published papers, of which 94 were published in SCIE / CC journals.

The University of Zagreb considers students' scientific and artistic activities an integral part of their education. Direct students inclusion into scientific and artistic activities is an essential and an integral part of the study program which enables the development of critical thinking and creativity, autonomous learning and gaining additional knowledge and research skills.

The best student scientific or artistic research is awarded by the [Rector's Award of the University in Zagreb](#). One of the conditions for obtaining the Rector's Award is that the paper is published within the existing research project. In the last 5 years, 119 students have been awarded by the Rector's Award in different categories.

Postgraduate doctoral study specially evaluates the participation in research projects. PhD student [earns ECTS credits](#) by participating in projects. ECTS credits can also be obtained by verified research on international projects, domestic scientific projects, technology and development projects for industry.

Teachers who are reappointed to academic rank and are active scientists at the Faculty teach at the postgraduate doctoral study. Teachers prove their competencies by publishing relevant papers on the subject they have been teaching for the last five years, as well as by working on scientific and professional projects. One work qualifies the teacher for only one of his subjects.

A professor emeritus may participate in the course. The competent body entrusts teaching for each subject and for each academic year (teaching plan). Teacher, scientists, field experts, internationally acknowledged scientists and top experts from abroad can be course coordinators as well. If teachers are not appointed to academic rank they have to be appointed to appropriate titular academic rank.

In order to improve teaching and scientific work, faculties can invite and appoint prominent teachers outside the institution, i.e. teachers and scientists from the country or abroad as guest teachers, who will hold lectures at the postgraduate studies.

Teachers who have been appointed to academic rank as assistant professor, associate professor or full professor are potential postgraduate doctoral study advisors. PhD advisor may be a person who is scientifically active and relevant in an international scientific community. Advisor proves his/her competences by publishing papers related to the topic of doctoral research and by listing domestic and international scientific projects.

Doctoral programme is based mostly on research. The programme encompasses one obligatory course and five elective courses. Courses can be selected in any doctoral programme and other components at the University. The procedure for selecting a course when enrolling a doctoral study is prescribed by the Regulation.