University of Zagreb
Faculty of Mechanical Engineering and Naval Architecture

SVEUČILIŠTE U ZAGREBU
METALURŠKI FAKULTET
UNIVERSITY OF ZAGREB
FACULTY OF METALLURGY

Self-Evaluation of Postgraduate University Study Programme

Doctoral study in Mechanical Engineering, Naval Architecture, Aeronautical Engineering, Metallurgical Engineering

26 April 2016

University of Zagreb

FACULTY OF MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE

Zagreb, Ivana Lučića 5

Class: 251-66-1700-16-19

Reg.No.: 251-66-1700-16-19

Zagreb, 26 April 2016

Name of the evaluated higher education institution:

University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture

University of Zagreb, Faculty of Metallurgy

Name of the evaluated study programme:

Postgraduate doctoral study in Mechanical Engineering, Naval Architecture, Aeronautical Engineering, Metallurgical Engineering

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

Year of establishment: **2014**

Address: **Zagreb, Ivana Lučića 5**

Phone: **++ 385 1 6168106**

Fax: **++ 385 1 6157128**

Website: **doktorski.fsb.hr**

E-mail: **doktorski@fsb.hr**

Title, name and surname of the head of the Faculty of Mechanical Engineering and Naval Architecture: **Dean, DSc. Zvonimir Guzović, Full Professor**

Title, name and surname of the head of the Faculty of Metallurgy: **Dean, DSc. Ladislav Lazić, Full Professor**

The Self-evaluation Report of the Doctoral Study Mechanical Engineering, Naval Architecture, Aeronautical Engineering, Metallurgical Engineering was drafted in cooperation with the Faculty's departments, chairs and expert services by the Postgraduate Studies Committee consisting of:

Prof. DSc. Joško Parunov, Committee President

Associate Professor DSc. Zdenka Zovko Brodarac, Vice-President

Prof. DSc. Neven Duić

Prof. DSc. Zoran Lulić

Associate Professor DSc. Goran Đukić

Prof. DSc. Franjo Cajner

Prof. DSc. Biserka Runje

Prof. DSc. Zdravko Terze

Associate Professor, DSc. Andrej Jokić

Associate Professor, DSc. Branko Bauer

Prof. DSc. Jurica Sorić

Prof. DSc. Božidar Matijević

Prof. DSc. Dubravko Majetić

Matea Klanac, mag. iur., Postgraduate Studies Expert Assistant

Izidora Herold, Expert Assistant for Final and Graduate Exams

The Self-evaluation Report was accepted by the Faculty Council of the Faculty of Mechanical Engineering and Naval Architecture at its session on 26 April 2016 and by the Faculty Council of the Faculty of Metallurgy at its session on 27 April 2016.

The Self-evaluation Report consists of 6 chapters written on 34 pages and 2 attachments.

Dean of FMENA:

Prof. DSc. Zvonimir Guzović

Dean of FM:

Prof. DSc. Ladislav Lazić

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

Klasa: 643 - 02 / 16 - 8 / 1
Urbroj: 251 - 66 - 1700 - 16 - 18
Zagreb, 02. svibnja 2016.

Fakultetsko vijeće Sveučilišta u Zagrebu, Fakulteta strojarstva i brodogradnje na svojoj 7. redovnoj sjednici održanoj 26. travnja 2016. godine, na temelju prijedloga Odbora za poslijediplomske studije i dekana Fakulteta strojarstva i brodogradnje Sveučilišta u Zagrebu, a u skladu s čl. 27. Statuta, donijelo je

O D L U K U

Prihvaća se **Samoanaliza u postupku reakreditacije poslijediplomskog sveučilišnog studija - doktorskog studija strojarstva, brodogradnje, zrakoplovstva, metalurgije,** kao u prilogu.

Prilog:
- Samoanaliza u postupku reakreditacije poslijediplomskog sveučilišnog studija

Dostaviti:
1. Metalurški fakultet, Sisak
2. Referada za poslijediplomske studije
3. Tajnik upravljanja
4. Pismohrana

Dekan

Prof. dr.sc. Zvonimir Guzović

p.v.

SVEUČILIŠTE U ZAGREBU
METALURŠKI FAKULTET

UNIVERSITY OF ZAGREB
FACULTY OF METALLURGY

SISAK

◈ FAKULTETSKO VIJEĆE ◈

KLASA: 602-04/16
URBROJ: 2176-78/16- 365

Sisak, 28. travnja 2016.

Na temelju članka 26. Statuta Metalurškog fakulteta, Fakultetsko vijeće na svojoj 10. redovitoj sjednici od 27. travnja 2016. godine (t. 12a), a na prijedlog Povjerenstva za znanost i financije, donosi sljedeću

O D L U K U

I.

Usvaja se tekst **Samoanalize doktorskog studija Strojarstvo, Brodogradnja, Zrakoplovstvo, Metalurgija** sastavljena u sklopu provedbe postupaka reakreditacije poslijediplomskih sveučilišnih studijskih programa u 2016. godini koje provodi Agencija za znanost i visoko obrazovanje prema svom Planu od 20. siječnja 2016. godine.

II.

Ova Odluka stupa na snagu danom donošenja.

Dekan Metalurškog fakulteta

prof. dr. sc. Ladislav Lazić

Dostavljeno:
1 x Fakultet strojarstva i brodogradnje
1 x Odbor za poslijediplomske studije
1 x Tajništvo
1 x pismohrana Fakultetskog vijeća
1 x pismohrana

Sveučilište u Zagrebu Metalurški fakultet
Aleja narodnih heroja 3; p.p.1; HR - 44103 Sisak
tel.: +385(0)44 533378; 533379; 533380; 533381
faks: +385(0)44 533378
e-mail: dekanat@simet.hr; url: www.simet.unizg.hr

I. General information and conditions of delivery

Name of the study programme:
Doctoral study: Mechanical Engineering, Naval Architecture, Aeronautical Engineering, Metallurgical Engineering

Name of the provider of the study programme:
University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture

Name of the implementer of the study programme:
University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture, Faculty of Metallurgy

Scientific area and field:
Scientific area: Technical science
Fields: Mechanical Engineering,
Naval Architecture,
Aeronautical Engineering, Rocket and Space Technology,
Basic Technical Science
Metallurgy

Place of delivery: Zagreb and Sisak

Number of doctoral candidates: There are 230 doctoral candidates enrolled in the postgraduate doctoral study. A total of 153 doctoral candidates are studying according to the "old" curriculum and 77 doctoral candidates according to the "new" curriculum. (Data: March 2016).

Number of teachers in the doctoral study: 142 (Data: March 2016)

Number of mentors in the doctoral study: 30 (Data: March 2016)

Learning outcomes: development of new and relevant knowledge and insights and their application; education of researchers in the selected scientific field; training of doctoral candidates in pursuing an independent research and interdisciplinary approach to problems, as well as an independent research and critical assessment of other's work; acquisition of knowledge, experience and skills enabling doctors of science to creatively and on science-based methods solve complex technical, technological, production and business problems; internationalisation of research at the University.

1. Prescribed minimal legal conditions of delivery

1.1. Register of Scientific Organisations

The Faculty of Mechanical Engineering and Naval Architecture is entered in the Register of Scientific Organisations in the scientific area of the doctoral study, as well as the positive outcome of the re-accreditation of scientific and higher education activities. The licence extending the status of scientific organisation was issued to the Faculty of Mechanical Engineering and Naval Architecture on 5 November 2007 and to the Faculty of Metallurgy on 15 June 2012. The new doctoral study underwent the accreditation procedure in 2014 and the National Council for Science gave a positive opinion and proposal for issuing the licence.

1.2. Two cycles of study programmes

Undergraduate and graduate study programmes in Mechanical Engineering, Naval Architecture and Aeronautical Engineering are carried out at the Faculty of Mechanical Engineering and Naval Architecture, whereas the undergraduate and graduate study programme in Metallurgy is conducted at the Faculty of Metallurgy in Sisak. The postgraduate doctoral study in Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering is a continuation of education upon completion of graduate studies in mechanical engineering, naval architecture and aeronautical engineering at the Faculty of Mechanical Engineering and Naval Architecture and metallurgical engineering at the Faculty of Metallurgy in Sisak.

Article 6 of 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 prescribes the required number of employees appointed to the research-and-teaching academic rank in the postgraduate university study, namely at least 5 employees. According to the records, in the academic year 2014/2015, the Faculty of Mechanical Engineering and Naval Architecture had a total of 123 full-time employees appointed to the research-and-teaching academic rank and the Faculty of Metallurgy has 18 full-time employees appointed to the research-and-teaching academic rank.

Article 7 of the Ordinance on Conditions for Issuing a Licence prescribes the minimum number of employed researchers, namely at least 15 of them, of which at least 5 in the scientific area of the scientific activity in which the Faculty performs scientific activity. In the academic year 2014/2015, 123 employees were employed in the teaching academic rank. All teachers are also researchers, given that the requirement to be appointed to the research-and-teaching rank is prior appointment to the research academic rank. Likewise, all researchers are employed in the area of the scientific activity in which the Faculty performs its scientific activity. The Faculty of Metallurgy has 17 employees in the research-and-teaching academic rank in the area of technical science (field: metallurgy (13), chemical engineering (2), mechanical engineering (1) and interdisciplinary area (1)), and one employee in the research-and-teaching academic rank in the area of natural science (field: physics).

1.3. Coverage with own teachers

A total of 129 teachers are staff members of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy, accounting for 91% of all teachers engaged in the doctoral study.

1.4. Teacher-student ratio

According to records, 123 teachers are employed at the Faculty of Mechanical Engineering and Naval Architecture in the academic year 2014/2015. In the academic year 2014/2015, a total of 2245 students enrolled in the undergraduate and graduate study programmes in Mechanical Engineering, Naval Architecture and Aeronautical Engineering, 60 students in the specialist postgraduate programme, and 230 doctoral candidates in the postgraduate doctoral programme. Therefore a total of 2535 students are studying at the Faculty of Mechanical Engineering and Naval Architecture.

In line with the presented data, the teacher-student ratio was 1 : 20.61 at the Faculty of Mechanical Engineering and Naval Architecture and 1 : 7.55 at the Faculty of Metallurgy in the academic year 2014/2015.

1.5. Publicity of doctoral theses (dissertations)

The publicity of doctoral theses is ensured by public defence of doctoral theses, publication of doctoral theses in the Repository, as well as publication of doctoral theses on the National University Library's website. The public defence of the doctoral thesis is prescribed by Article 44 and Article 57 of the Ordinance on Doctoral Study of Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering (hereinafter: Ordinance). The duty to publish the doctoral thesis in full both in the digital repository of the Faculty and on the University's website is prescribed by Article 22 of the Ordinance. Moreover, the National University Library publishes doctoral theses on its website.

1.6. Procedure of revoking the academic title (dr. sc.)

The Article 64 of the Ordinance prescribes the revocation of the academic title of Doctor of Science, if it is determined that it has been attained contrary to the conditions stipulated for its attainment, by severe violation of the studying rules or based on a doctoral thesis (dissertation) that has proved to be a plagiarism or a forgery.

The Article of 113 of the Statute of the Faculty of Mechanical Engineering and Naval Architecture prescribes the procedure of revoking the academic title of Doctor of Science. The revocation procedure is conducted on proposal of the Faculty Council in the procedure equivalent to that applied for attaining the title.

2. Additional conditions of the Accreditation Council

2.1. Number of teachers appointed to research-and-teaching ranks

In the academic year 2014/2015, 123 teachers were employed at the Faculty of Mechanical Engineering and Naval Architecture and 16 teachers at the Faculty of Metallurgy, all of them in the fields relevant for the delivery of the doctoral study.

2.2. Standard Scientific and Professional Activity

The licence extending the status of scientific organisation was issued to the Faculty of Mechanical Engineering and Naval Architecture on 5 November 2007 and to the Faculty of Metallurgy on 15 June 2012. The new doctoral study underwent the accreditation procedure in 2014 and the National Council for Science gave a positive opinion and proposal for issuing the licence. In the most recent reaccreditation, in drafting the Quality Assurance System Self-evaluation Report, the standard Scientific and Professional Activity was marked as "efficient".

2.3. Alignment with the strategic programme of scientific research

The new doctoral study programme is fully aligned with the University of Zagreb Research Strategy and Scientific Research Strategy of the Faculty of Metallurgy of the University of Zagreb for the period 2013-2016. Moreover, the doctoral study is also aligned with the Research and Development Strategy of the Faculty of Mechanical Engineering and Naval Architecture, which is part of the Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb.

2.4. Mentor-doctoral candidate ratio

There are 230 doctoral candidates enrolled in the doctoral study and 132 mentors, therefore the mentor-doctoral candidate ratio is 1 : 1.74 (data for the "old" and "new" doctoral study).

2.5. Mentor requirements

a) be employed in a research, research-and-teaching position or associate position (postdoctoral researcher) and hold at least two years of postdoctoral research experience;

The Article 41 of the Ordinance stipulates conditions for appointing mentors and, among other things, stipulates that a person at least in the research-and-teaching position of assistant professor, research associate position or an equivalent position can be appointed as a mentor, if this latter has acquired his/her academic title abroad.

b) be an active researcher in the scientific area of the doctoral study programme (publication of scientific papers, participation in international scientific conferences and/or projects in the past five years (t. 2.));

The Article 41 of the Ordinance stipulates conditions for appointing mentors and, among other things, stipulates that a person who is a manager or member of a scientific research project, that is, an active researcher in the scope of research of the doctoral thesis, as well as a person who is scientifically active and relevant in the international scientific community and who has published scientific papers related to the topic of the doctoral research in the past five years can be appointed as a mentor.

Tables giving an overview of the research activity dynamics of mentors of the doctoral study Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering are attached to this Self-Evaluation Report.

c) to confirm the feasibility of the draft research plan upon admission of the doctoral candidate (or upon submission of the topic)

Upon admission, an interview with the applicant is a mandatory part of the admission procedure. The interview with the applicant is conducted by the Committee for the admission of candidates appointed by the Postgraduate Studies Committee. The potential applicant mentor is a member of the Committee and confirms feasibility of the draft research plan upon admission of the doctoral candidate by signature.

Applying for a doctoral thesis topic is a procedure conducted before the Postgraduate Studies Committee. The doctoral candidate and mentor are preparing together the required University Form (DrSc 01), and the mentor has the duty to attend the Committee session to present the topic, research and objectives to the Committee's members. The mentor is responsible for his/her doctoral candidate work and confirms feasibility of the research plan.

d) to ensure the conditions (and funding) necessary to implement the candidate's research (in line with the draft research plan) as a research project leader, co-leader, collaborator or in other ways;

The Article 43 of the Ordinance stipulates the obligation of the mentor to monitor the quality of the doctoral candidate's performance, promote the publishing of his/her papers and enable participation in scientific projects.

e) to be trained for the role before assuming it (through co-mentoring, workshops, etc.);

Pursuant to Article 42 of the Ordinance every mentor shall, before undertaking the first mentorship, attend a workshop on mentoring organised by the University or an accredited international school. In 2015, two mentoring workshops attended by a total of 44 teachers were organised, on 16 September and 26 November respectively.

f) to receive a positive opinion of the higher education institution on previous supervisory work

The Faculty Council approves the proposed topic and confirms the proposed mentor by the time the doctoral candidate enrols into the 4th semester. The Faculty submits the topic and mentor for adoption to the University. Such a procedure requires a positive opinion of the higher education institution on mentor’s supervisory work.

2.6. Teacher requirements

a) be employed in a research or a research-and-teaching position

Teachers of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy are employed in scientific-and-teaching positions and upon appointment have to meet, among other things, the requirement to be appointed to a scientific/research rank.

b) be an active researcher, recognized in the field relevant for the course (t. 1.).

Teachers involved in the doctoral study are active scientists, which is proved by a list of competencies in every course they teach no older than five years.

2.7. Mentor's role in the procedure for dissertation defence

In the framework of the doctoral study for acquiring the degree of Doctor of Science the Committee for Dissertation Topic Evaluation and Mentor Proposal and the Dissertation Defence and Assessment Committee are established. The Committee for Dissertation Topic Evaluation and Mentor Proposal consists of three to five members and in particular: Committee President, study adviser and at least one member who is neither a teacher at the doctoral study nor a Faculty's employee. The Dissertation Defence and Assessment Committee consists of three to five members whose scientific activity belongs to the applicant's dissertation area. The Article 46 of the Ordinance stipulates that a mentor cannot be a member of the Dissertation Defence and Assessment Committee.

2.8. Doctoral study research component

As a rule, a full-time doctoral study generally lasts three years (6 semesters). Over that period, according to the doctoral study programme, the doctoral candidate shall, among other things, participate in all foreseen forms of teaching, research, research-driven mobility and industry-related research. Furthermore, the doctoral candidate shall publish papers in scientific journals, scientific conference proceedings, and defend the dissertation topic and the dissertation itself in public. Before defending his/her dissertation, the doctoral student shall have, among other things, one CC publication related to the doctoral research published, two international conferences attended and two presentations delivered at the doctoral candidates' workshop. The doctoral candidate may collect ECTS points also in other research activities, for instance, by making experimental exhibits, working on projects and achieving research awards, what additionally motivates doctoral candidates to engage in quality research work.

2.9. Coverage with own teachers for joint programmes

129 teachers are staff members of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy, accounting for 91% of all teachers engaged in the doctoral study.

II. Self-evaluation based on the criteria for assessing quality

3. Teaching, mentoring and research capacities and infrastructure

3.1. Reputation of HEI

Postgraduate studies in the field of technical sciences in Croatia date back to 1921, when the Council of the Royal Technical College in Zagreb introduced regulations for acquiring a Ph.D. degree in engineering sciences. The first Ph.D. degree in engineering sciences was obtained by Konstantin Čališev in 1922. Prof.dr.sc. Ivo Hercigonja, professor at the Faculty of Mechanical Engineering and Naval Architecture, was the first to be awarded a Ph.D. degree in mechanical engineering in 1931. The postgraduate studies in mechanical engineering and naval architecture at the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, have a long tradition. The first postgraduate programme titled "Engineering and Economics of Automation" was organised in conjunction with the Faculty of Electrical Engineering and Faculty of Economics in Zagreb in 1962. In the academic year 1963/1964, the postgraduate programme titled "Technology and Organisation of Engineering Production" was organised. In 1965/1966, the Department of Naval Architecture organized the postgraduate study "Theory of Ship Design" in conjunction with the Faculty of Civil Engineering in Zagreb.

Since these beginnings up until today, the curricula of the postgraduate studies at the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb have been updated and modernized in line with the development of mechanical engineering and naval architecture and legal regulations. By the end of 2015, 894 students obtained their Master's degrees and 496 their Doctor of Technical Science degrees at different postgraduate studies organised at the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb.

The postgraduate study in Metallurgy in the Republic of Croatia, as a third-level full-time study, was introduced in the framework of the Department of Metallurgy in Sisak in the academic year 1965/1966. The Department of Metallurgy in Sisak as a department of the Faculty of Technology of Zagreb thus started providing education to students of the Postgraduate Master's Study Programme in the scientific field of Metallurgy. Admissions to the Postgraduate Study Programme in Metallurgy were not held every year but rather based on a sufficient number of interested applicants from companies, higher education and research institutions.

The Postgraduate Doctoral Study Programme in Metallurgy, in accordance with the Bologna process, has been delivered since the academic year 2007/2008. The study programme lasted three years (6

semesters) and the scope of students' obligations was covered by 180 ECTS points. The doctoral study programme in Metallurgy was structured in such a way that it represented a continuation of the graduate study in metallurgy and/or related graduate study with a focus on the students' research work. The objective of the postgraduate doctoral study programme in metallurgy was to educate students as future scientists and experts working in development departments in the industry of metallurgy and metal processing, research institutions, higher education institutions, etc. Thus students were trained for transfer of technology and know-how in the scientific field of Metallurgy.

During the operation of the Department of Metallurgy (1960-1974), Metallurgy Engineering (1974-1978) in Sisak of the Faculty of Technology of Zagreb, that is, Faculty of Metallurgy (from 1979-) 52 students completed the postgraduate master's study and 32 candidates defended their doctoral dissertation in the scientific field of Metallurgy.

The University of Zagreb – Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy base their international reputation on 358 original scientific and review papers published in journals that are indexed in the Current Contents (CC) data base, 30 other papers, mainly editorials, published in journals refereed in the same database, 334 scientific papers published in other journals, 764 scientific papers published in conference proceedings with international reviews in the period from 2011 to 2015 (Source: Web of science). The Faculties are organisers or co-organisers of a range of scientific conferences, some of them among the best in the world in their field (DESIGN, ECCOMAS, SDEWES, IFC). In addition, teachers of the Faculties act as scientific leaders of symposiums in the framework of the world's most famous conferences (ASME, ECCM, ECCOMAS) and are members of management boards of prominent scientific associations and management divisions (ASME, ACARE). The Faculties have participated in over 40 international projects or projects with an international component, CIP (8), COST (4), EUREKA (7), FP5 (1), FP6 (9), FP7 (4), HORIZON (2), LEONARDO (1), LIFE (1), Tempus (5), SEE.ERA-NET (1), UKF (1) etc. The Faculties are open to international mobility, in particular to outbound mobility. As a result, 15 researchers spent more than a year at international institutions, whereas 15 foreign researchers have undertaken institutional study visits over the past 5 years. The teachers of the Faculties are engaged as lecturers in Ph.D. programmes of prominent EU universities, whereas on a research and teaching basis, the Faculty cooperates with over 130 international institutions, out of which 22 are on the ARWU list, 5 of which are ranked among the top 100 universities. The Faculties' researchers are members of 60 international associations. In the period from 2011 to 2015, 83 doctoral dissertations have been successfully defended before committees consisting of more than 30 foreign members.

International reputation of each module of the doctoral study is described in the text that follows.

Naval Architecture and Ocean Engineering

As a result of the research on safety of environmentally acceptable ship and offshore structures a number of papers were published in international journals in the fields of loads and response of ship structures, dynamics of motion and loads of offshore structures, safety assessment, multi-criteria design models in optimization, and in ship design and construction. Within this research, papers in the fields of reliability, aging and fatigue of structures, and ship collisions were published. Within

the research on large container vessels significant papers in the fields of hydroelasticity and vibration of thin-walled girders were published. Results of the research are part of the study program.

Industrial Engineering and Management

The number of students graduating from Industrial Engineering has been among the highest in the world immediately followed by those graduating from Civil Engineering, Electrical and Mechanical Engineering. New studies in Industrial Engineering and Management are emerging all over Europe and the number of students and postgraduates is growing because of a wide range of knowledge and skills provided by the study and needed in practice.

Materials engineering

Research into engineering ceramics, functional nanostructured sol-gel ceramic films and coatings has resulted in a number of papers published and cited in reputable CC journals. The group that deals with the modelling of material properties and process parameters and with the quenching of steel and which has launched a new research field of nanofluids is among the most recognized in the world. In 2010, the Quenching Research Centre was established at FMENA and has already been recognized internationally. The group that examines and tests tribological properties has been involved in the COST programs for a number of years.

Mechatronics and robotics

The module research topics are in the peak of world scientific activities, with titles that can be recognized as key words, directions and trends in international scientific research areas. The doctoral study module additionally improves the reputation of both the FMENA and the University of Zagreb in international scientific research and contributes in creating a critical mass of scientists and accumulation of knowledge necessary for sustainability and competitiveness of scientific research in the mentioned areas of research.

Metallurgical Engineering

Research in the field of Metallurgy at the Faculty of Metallurgy has a 50 year long tradition. At the same time the scientific-and-research activity in metallurgy is monitored and aligned with research at related global, in particular European, higher education and research institutions. The reputation of the doctoral study module metallurgical engineering is based on publications in the field of metallurgy in reputable international journals (ISI – Web of Knowledge) and in particular on published results of joint scientific research with prominent international scientists. Two distinguished international scientists in the field of metallurgy from the Faculty of Natural Sciences and Engineering of the University of Ljubljana are also involved in teaching.

Computational mechanics

The module computational mechanics has a high degree of reputation and competitiveness in the research topics covered by the module. Based on papers published in leading international journals, teachers are renowned in the following areas: development of meshless methods, modelling of cardiovascular diseases, damage modelling, biological flows, transport phenomena, environmental dynamics, multiscale modelling of mechanical behaviour of materials.

Advanced Production Technologies

Numerous scientific papers in scientific journals and papers presented at international scientific conferences result in international reputation of scientific research. Furthermore, implemented international projects also open the way to new scientific collaborations in this field.

Process and Energy Engineering

The research in power and process engineering, energy management and environmental engineering results in a number of papers published and cited in scientific journals referenced in CC / SCI. Individual research groups have numerous international research projects (more than 10) in the framework of the FP7, IEE, SEE, bilateral cooperation programs, and research projects with industry. Constant cooperation with a number of leading European universities and institutes exists, as well as the exchange of professors and PhD students.

Theory of structures

Professors teaching in this module achieved international reputation by publishing papers in international journals, by cooperation in scientific research joint projects with respectable foreign companies, by participation in scientific committees and by reviewing papers of prominent journals and by reviewing international scientific projects. Several professors spent some time in specializations at prominent international scientific institutions with whom they developed a research cooperation. Achieved international reputation of professors will undoubtedly contribute to the international reputation of the doctoral study module in question.

Aeronautical Engineering

Beside joint research activities with scientists from international institutions (which resulted in numerous publications), our teachers have a distinguished international reputation in certain research areas, thus enhancing the reputation of the module itself. As scientific leaders of symposia at respectable international conferences, members of boards of international institutions and associations, members of scientific committees, and reviewers of projects and scientific papers in distinguished international journals, our teachers play an active role in shaping the relevant research areas, what will lead to direct implementation of latest research content and international reputation of the module.

Scientific metrology

The international recognition of the module Scientific metrology in scientific research is most evident in the accomplishments achieved within the EURAMET projects as well as through the relevance of the research results presented in scientific papers. Thanks to the faculty's national laboratories the Croatian metrology system has been recognized for its quality at both the European and global levels.

3.2. Number and workload of teachers

A total of 142 teachers are participating in the doctoral study and in particular: 113 teachers of FMENA, 16 teachers of the Faculty of Metallurgy, 2 teachers of the Politecnico di Milano, Italy, 2 teachers of the Naravoslovnotehniške fakultete Univerze v Ljubljani, Slovenia and 1 teacher

respectively of the Faculty of Science of the University of Zagreb, Faculty of Engineering of the University of Rijeka, Faculty of Mechanical Engineering in Slavonski Brod, TOPOMATIKA d.o.o., Zagreb, Centre for Marine Technology and Engineering (CENTEC), Technical University of Lisbon, Portugal, Center for Metrology and Accreditation, Finland, Aalborg University, Denmark, BUREAU VERITAS, Paris, France. It clearly emerges that 129 teachers are staff members of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy, which accounts for 91% of all teachers engaged in the doctoral study.

The share of teachers participating in teaching is limited by the share sum $\sum U\_course <= 2$, meaning that each teacher may be a single leader for up to 2 courses. The teaching share of each teacher on a single course is calculated as $U\_course = 1/n$, where n is the number of course leaders. This ensures the appropriate total workload of teachers in the doctoral study programme.

3.3. Qualifications of teachers

Teaching at the doctoral study is assigned by the competent body to Faculty staff appointed to research-and-teaching academic rank. Their competence is proved on the basis of papers published in the last five years and a list of national and international scientific projects, whereby a single paper qualifies a teacher just for one course.

Teaching may be also in part conducted by an Emeritus Professor. For each academic year, teaching within every single course is assigned by the competent body (detailed syllabus).

A teacher, a researcher, an external expert or a teacher from another higher education institution, an internationally recognized researcher and top expert from abroad can be the person in charge of the course. If these responsible persons are not appointed to the research-and-teaching academic rank they have to be appointed to the corresponding visiting research-and-teaching academic rank.

For the purpose of improving teaching and research, the involved Faculties may also invite and appoint prominent teachers and researchers from Croatia and abroad as visiting teachers to hold part of the lectures within the postgraduate studies.

3.4. Number of mentors and their qualifications

All teachers of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy of the University of Zagreb are potential mentors, if they have been appointed to the scientific-and-research rank of an assistant professor, associate professor, full professor and full professor without limit of term.

There are 73 full professors, 34 associate professors, 35 assistant professors and 12 teachers who are neither FMENA nor FM teachers on the list of potential mentors.

This number enables the doctoral candidate-mentor ratio to be significantly below 1:3.

3.5. Qualifications assessment of teachers and mentors

Teachers prove their competencies as course leaders by published papers in the last five years, which are relevant for the course they are delivering, as well as by providing a list of national and international scientific and technological projects, where they acted as leaders or participants in the last five years. In this regard, a single paper qualifies a teacher just for one course.

Mentors prove their competencies by papers published in the last five years and by providing a list of national and international scientific projects. The competencies of mentors are particularly considered upon submitting the dissertation topic, when competencies in the last five years starting from the date of dissertation topic submission need to be indicated.

3.6. Research resources

The Faculty of Mechanical Engineering and Naval Architecture has 71 lecture rooms with a total area of 4942 sqm and 2448 seats. Space conditions are satisfactory in terms of size and disposition. The number of lecture rooms and laboratories (the Faculty has 43 laboratories) corresponds to the number of enrolled students (at present, 2360 students including postgraduate students) as well as to the scientific-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 requirements of students. There is a cluster of computers and server computers intended for sophisticated analyses and numerical simulations. The Faculty's library has a rich collection of books and journals, is equipped with air-conditioning and computers, and offers good working conditions for students.

At the beginning of his or her studies, every student of the doctoral study programme is provided with a user account to access the LDAP database used for the purpose of connecting to the Faculty's wireless network, through VIP CARNet Broadband, CARNet modem entries, using 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 sign up procedure for accessing a computer account in PC classrooms published on the Faculty's website.

The Faculty's library is located in the high ground floor of the south building of the faculty, which makes it easily accessible to students and other visitors. It occupies an area of approximately 600 square metres and consists of a library staff working space, a reference classroom equipped with computers and a storeroom of library materials partly accessible by public (a total area of about 320 sqm), 2 reading rooms for students (about 160 sqm) and a closed store place (about 120 sqm). The reference classroom has 40 working posts, of which 16 are equipped with computers connected to the Internet. Student reading rooms have a total of 52 working posts (26+26). The Library offers the possibility of autonomous scanning. The Library has also a copying machine.

The Library's collection encompasses approximately 20000 books and about 400 journal titles. There are over 60000 books held in departments, the majority of which are centrally processed by the library's software. The oldest book dates back to 1673.

Apart from the standard reference bibliography (dictionaries, encyclopaedias, handbooks, lexicons…) the greatest part of the material consists of scientific and specialized publications which cover a wide area of technical science, in particular the scientific fields of mechanical engineering, naval architecture and aeronautical engineering. Moreover there is also a specialised and exam bibliography from other fields integrated into the Faculty's study programmes (mathematics, physics, chemistry, marketing, ecology, foreign languages). By continuously purchasing new professional and scientific literature, efforts are being made to keep the library's collection up to date as much as possible. The subscriptions to domestic and foreign professional and scientific journals

relevant for the mechanical engineering, naval architecture and aeronautical engineering fields are renewed every year.

The Faculty's Library is an academic library which by its collections and services provides an information and communication support to scientific and teaching activities of the mainstream institution. As an open academic library, the Faculty's library is intended primarily for employees and students of the Faculty, but it is also open to outside visitors who need a piece of literature or any other information in the fields of mechanical engineering, naval architecture and aeronautical engineering. The Library's working hours are from Monday to Friday, from 8 AM to 6 PM, whereas the two reading rooms are available to students from 8 AM to 9 PM.

The IT level of the Faculty's Library is high and efforts are continuously being employed for further improvement and development. By virtue of consortium agreements, the Ministry of Science Education and Sports provides scientific institutions with access to a certain number of databases, either bibliographic or full text bases, such as CurrentContents, WebofScience, ScienceDirect, Ebsco, SpringerLink etc. At the Library users can always get help in searching databases and finding the relevant sources of information.

Moreover, the Faculty's Library was the first in Croatia to launch a digital repository of degree essays, where, apart from master's theses and doctoral dissertations, final and graduation theses are archived too. An enlargement of the digital repository (http://www.fsb.unizg.hr/library/repository.php) is planned to encompass also other types of works (articles, reports…).

All publications purchased from 1991 up until today are computerized and can be searched through the online catalogue within the library's network station at http://www.fsb.unizg.hr/library/. The Library uses Aleph, an integrated library system to process library materials.

The Faculty of Metallurgy has 6 lecture rooms and one computer classroom with a total area of 370 sqm with 265 seats. Space conditions are satisfactory in terms of size and disposition. The Faculty of Metallurgy has 7 laboratories with a total area of 1071 sqm and 90 working posts for students. The number of lecture rooms and laboratories correspond to the number of enrolled students (at present, 143 students including the postgraduate study programme) as well as to the scientific-and-research needs of the Faculty. In line with the level of equipment, laboratories are suitable for research purposes. The computer classroom is well equipped and meets all the requirements of students.

At the beginning of his or her studies, every student of the doctoral study programme is provided with an AAI@EduHr electronic identity on the server of the Faculty of Metallurgy according to a prescribed procedure. The identity is used for accessing many services connected to this system: access to eduroam wireless network, mobile and broadband internet from home, e-learning system, scientific bibliographies, full text databases, citation databases, e-books, applying for exams through the Studomat application etc. The PCs in the computer classroom can be accessed upon prior agreement with the system engineer of the Faculty of Metallurgy. The computer classroom of the Faculty of Metallurgy has 24 working posts for students and 1 working post for professors. All PCs have an internet connection.

The Library of the Faculty of Metallurgy is located on the ground floor next to the main building, which makes it easily accessible to all users. It occupies a total area of 165 sqm comprising a library and reading room of 70 sqm, a storeroom of library materials – journals of 20 sqm and part of a store

place of 75 sqm. Users may use a reading room with 8 working posts and a copying service. The Library's collection encompasses around 11100 books. Apart from the standard reference bibliography (dictionaries, encyclopaedias, handbooks, lexicons…) the greatest part of the material consists of scientific and specialized publications which cover a wide area of technical science, in particular the scientific field of metallurgy, as well as other fields integrated into the Faculty's study programmes (mathematics, physics, chemistry, ecology, foreign languages etc.). By continuously purchasing new professional and scientific literature, efforts are being made to keep the library's collection up to date as much as possible. The Faculty's Library is an academic library which by its collections and services provides an information and communication support to scientific and teaching activities of the mainstream institution. As a closed-type academic library, the Faculty's library is intended primarily for employees and students of the Faculty. The Library's working hours are from Monday to Friday, from 7 AM to 3 PM, during which the reading room can be used. Efforts are continuously being employed to further develop and improve the library's digitalisation. The Library uses Aleph, an integrated library system to process library materials. All publications are computerized and can be searched through the online catalogue within the Faculty's website.

The Ministry of Science Education and Sports provides scientific institutions with access to a certain number of databases, either bibliographic or full text databases.

The Library of the Faculty of Metallurgy is part of the DABAR system (Digital Academic Archives and Repositories) as well as of the National Repository of Electronic Theses and Dissertations (ZIR), whereby the Repository of the Faculty of Metallurgy has been established and process of entering theses and dissertations has begun.

More information is available on the Faculty's Library website:
http://www.simet.unizg.hr/dokumenti/knjiznica.

4. Internal Quality Assurance of the Study Programme

4.1. Justification of the doctoral study

The main reason for the need of the existent, newly-formed doctoral study is to align the study programmes of the Doctoral Study of Mechanical Engineering and Naval Architecture with the **Regulations on Doctoral Studies at the University of Zagreb** in force since 20 April 2010. The second main reason was a ground change in the courses offered and their contents as well as reorganisation of modules comprised by the doctoral study with a focus on rationalisation of the doctoral education by joining the doctoral study of the Faculty of Metallurgy. Economic needs justifying the need for a doctoral study are motivated in detail in the existent **Detailed Overview of Doctoral Programme Mechanical Engineering, Naval Architecture, Aeronautical Engineering, Metallurgical Engineering**, whereas only basic principles are given below.

For the economy of a small country, with limited energy resources, raw materials and market, the only way to prosperity is provided by knowledge and its implementation in the development, what requires an active role of the university. Such cooperation is particularly visible through the Doctoral Study of Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering, in such a way that single complex industry-related problems result in research that

ultimately leads to a dissertation. It is clear that such form of cooperation is lucrative both for the academic community as well as for the economy and industry leading to new and competitive products for this latter. Knowledge acquired through research has to find its way to be implemented in industry by fostering its development. Modern economy dynamic is conditioned by innovativeness and application of scientific knowledge. By nature of their mission, private and public institutions, research institutions, defence forces and naval, land and air forces would be unthinkable without intensive research and development, with participation of competent experts and researchers who have developed their creative potential at the proposed doctoral study. The general objective of the doctoral study in question is to train Ph.D. experts for starting small companies, participating and taking a leading role in research institutions and economy. Creation and fast transfer of state-of-the-art research know-how in private and public sectors are fostered. Therefore the possibility of employing staff with this kind of knowledge is huge and certainly desirable and possible outside Croatia. The Doctoral Study of Mechanical Engineering, Naval Architecture, Aeronautical Engineering, and Metallurgical Engineering, is an area of high technological development that emerges from fundamental and applied research in all areas of technology and applied sciences. As a result, a wide-ranging postgraduate teaching comprising highly professional courses that will find their full application in research in several public and private sector areas will be enabled and research positions will be opened.

4.2. Alignment with the HEI research mission, vision and strategy

The doctoral study of the Faculty of Mechanical Engineering and Naval Architecture (FMENA) and the Faculty of Metallurgy (FM) is fully aligned with the **University of Zagreb Research Strategy.** Even more so, thanks to its primarily research-driven activities and internationally-oriented courses and teaching contents, the joint doctoral study run jointly by the Faculty of Mechanical Engineering and Naval Architecture and the Faculty of Metallurgy will strongly promote the strategic determinants of the University of Zagreb in terms of fulfilling the fundamental strategic objective of the Research Strategy as well as immediate objectives outlined in this strategic document.

The principal strategic objective on the national level, to fortify the leading role of the University of Zagreb by increasing research and teaching quality and by participation in significant research projects, is fully endorsed by the doctoral study. All study modules are especially research-oriented, whereas certain scientific topics are closely linked to current scientific projects run at both the Faculty of Mechanical Engineering and Naval Architecture and the Faculty of Metallurgy with financial support of national science foundations (Foundation of the Ministry of Science, Education and Sports, Croatian Science Foundation, UKF etc.). Moreover, at international level of scientific promotion, by means of scientific networking and international relevance of certain topics, the doctoral study prepares scientific attendees to intensively participate in international research projects, thus directly promoting excellence, raising the profile and recognition of the University of Zagreb, which is again a strategic objective of the University.

Moreover, by involving internationally recognised researchers to participate as teachers and co-leaders of certain courses in running the programme, international cooperation between the University of Zagreb and renowned international research centres as well as scientific cooperation between national researchers and their peers from the Europe's and the world's most prestigious

universities are furthermore promoted. Here should be emphasized that the indicated international cooperation intrinsically emerges from the research activities conducted so far by the teachers of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy, and the doctoral study will give a further boost to even more cooperation and involvement of doctoral students and junior researchers in current and enlarged future cooperation possibilities, which is fully in line with the strategic guidelines of the University.

Joining forces with the Faculty of Metallurgy enables the synergy of research and human capacities by introducing the doctoral study module Metallurgical Engineering so far inexistent either at the University of Zagreb or at any other university in the Republic of Croatia. The newly formed doctoral study module represents a continuation of education upon completion of graduate studies in metallurgy at the Faculty of Metallurgy of the University of Zagreb, related graduate studies at the University of Zagreb and other universities at home and abroad. The purpose of the module is to ensure education continuity in the scientific field of metallurgy with the aim of increasing our research and development capabilities in the real sector within the framework of industry of metallurgy and metal processing. This has contributed not only to knowledge transfer in the public and private sectors but also to increasing the level of research and development capabilities of the public and private sectors. At the same time, human resources for the sustainability and existence of the higher education in technical science in the field of metallurgy as well as knowledge transfer towards research institutes are ensured. There are no unemployed Doctors of Science in the field of metallurgy on the Croatian labour market. The new doctoral study module is fully aligned with the **University of Zagreb Research Strategy and Scientific Research Strategy of the Faculty of Metallurgy of the University of Zagreb** for the period 2013-2016. Teachers of the Faculty of Metallurgy are involved in national and international scientific research projects and tasks.

The concept of this new doctoral study directly encourages greater mobility of a younger generation of researchers, given that scientific excellence is put at the forefront of the research activity within the doctoral study. Such a concept naturally improves scientific networking and leads to joint research projects with peers from other European and world universities, and in accordance with the Research Strategy of the University of Zagreb, it promotes the implementation of international projects and the enlargement of the University's scientific infrastructure

The Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb was accepted by the Faculty Council at its meeting on 15 April 2014 and it contains the main objectives set for the next period.

The first general objective of the **Innovation and Research Strategy of FMENA** is to improve the research potential of the Faculty, with a special objective under 1.10 to continuously develop the doctoral studies in order to increase the number of doctoral students. The second general objective is to improve the research influence of the Faculty on the economy with a specific objective under 2.3 to ensure sufficient number of researchers as to create the critical mass necessary for sustainability of those industrial areas that achieve the highest added value and have the strongest societal impact and it is closely related to the objectives of the Doctoral study. The third general objective is to improve the international research visibility of the Faculty with specific objectives 3.4 to endure the internationalization of the doctoral studies and mechanisms to attract the best foreign candidates, which would result in theses of highest scientific value and 3.6 to intensify international cooperation,

not exclusively through research projects, but also through other mechanisms such as *cotutelles*, with the most prominent international universities, are fully aligned with the programme and objectives of the Doctoral study.

4.3. Periodic reviews of the doctoral study programme

Quality indicators of the doctoral study programme are:

- Scientific production of teachers and doctoral students,
- Quality of teaching,
- Relevance and quality of doctoral dissertations,
- Statistical data on duration of study,
- Statistical data on the number of new holders of doctoral degrees in relation to the number of doctoral students annually,
- International cooperation accomplished,
- Mobility of doctoral students,
- Employability of Doctors of Science.

Doctoral students were consulted during the process of setting up the programme of the doctoral study, in the earliest stages of concept development and subsequently after the proposal of the programme of the doctoral study was fully prepared. Their comments and suggestions were taken into account in drawing up the final proposal, where applicable.

In preparing the Committee's annual report, all doctoral students are sent a survey, which is filled in using the University's standard form, and whose results are then analysed in the report, which is also filled in using the University's standard form. Surveys serve to collect information on the level of satisfaction with the doctoral study and potential for improvement.

According to the terms prescribed by the University of Zagreb, a Self-evaluation Report of the doctoral study is drawn up to outline the situation of the doctoral study and propose its improvement.

The Postgraduate Studies Committee is in charge of monitoring and coordinating the postgraduate study programme and reports to the Faculty Council. The Committee's members, chair and deputy chair, as well as modules' heads are elected by the Faculty Council to a term of two years on proposal of the Faculty's Dean. All heads of the doctoral study modules and the Vice-Dean for Research and Cooperation with Economy take part in the Committee's activities. The Student Service runs all administrative activities for the needs of the doctoral study.

4.4. Evaluation of mentors and resolving conflict situations

On proposal of the doctoral candidate and with consent of the potential mentor, the doctoral candidate is assigned a mentor appointed by the Postgraduate Studies Committee during enrolment or on the first year of study, at the latest within three months after submitting the dissertation topic. If a potential mentor has not been established during admission, the doctoral candidate is assigned a study adviser by the Postgraduate Studies Committee, who helps him/her in choosing and defending the dissertation topic and monitors his/her work and progress up until a mentor is nominated.

Regular fulfilment of obligations related to research, cooperation on national and international projects, industry-related research, international mobility and publications is confirmed by the study adviser or mentor by signing the student's record book.

The rights and obligations of doctoral students, mentors and study providers are set out in the Regulations on Postgraduate Studies.

To the mentor position can be nominated a person who:

1. has been appointed at least to the research-and-teaching rank of Assistant Professor or Research Associate, or an equivalent rank with regard to a mentor who has been awarded the academic rank abroad;
2. is a leader or member of a research project, i.e., an active researcher in the field of research correlated with the dissertation;
3. is a scientifically active person, relevant to the international research community, who has been publishing papers correlated to the doctoral research topic in the last five years.
4. A mentor may also be an Emeritus Professor, in case there is a lack at the Faculty of a scientifically active and competent person in the topic of research of the doctoral candidate, whereas the decision thereon is made by the Faculty Council.

Before embarking upon the first mentorship, a workshop on mentoring organized by the University or an accredited international school should be attended. The Postgraduate Studies Committee shall decide on the number of doctoral candidates a mentor can simultaneously supervise. A mentor who is not employed at the Faculty must sign a cooperation agreement and undertake commitment with the Faculty's Dean. A mentor who has embarked upon mentorship before retiring has the right to run the mentorship until the end, with the Committee's consent.

A mentor shall guide the doctoral candidate in drawing up the dissertation, monitor the quality of the doctoral student's performance, promote the publishing of his/her papers and enable participation on scientific projects.

If there is more than one mentor, each of them undertakes the responsibility for the part of the research and dissertation writing procedure that needs to be determined in advance. Once a year, the mentor shall submit a report on the doctoral student's performance to the Faculty Council on a form prescribed by the University. Prior to the appointment of a mentor, the report is submitted by the study adviser.

In order to ensure the quality of the dissertation, co-mentoring should be enabled, where applicable (for instance, interdisciplinary research, conducting research in more institutions). If the doctoral candidate would like to obtain a dual doctoral degree, co-mentoring is mandatory.

The doctoral candidate has the right to change just once the mentor or the dissertation topic by filing a written request and obtaining an opinion of the incumbent mentor using a prescribed University's form.

4.5. Academic integrity and freedom of research

The basic characteristics of doctoral studies are research and learning through research, internationalization, transparency, international benchmarks of quality and international competitiveness.

Freedom of scientific research and creation are the key components of the university doctoral study.

The academic degree of a Doctor of Science shall be revoked if it is established that it has been obtained contrary to the prescribed conditions for its award, serious violation of the rules of study or on the basis of a doctoral dissertation which is a result of plagiarism or falsification.

4.6. The process of developing and defending the thesis proposal (topic)

During the first year of the doctoral study, the doctoral candidate proposes both a mentor and a topic and agrees upon the working requirements, in particular the requirements of research funding. The doctoral candidate starts the procedure of dissertation topic approval by filing an application. The application is filed on the form provided by the University. The doctoral candidate must publicly defend the topic he/she applied for before a Committee for Dissertation Topic Evaluation and Mentor Proposal, other doctoral candidates and well as all other interested parties. The protocol for defending the doctoral thesis topic is publicly available.

The Committee for Dissertation Topic Evaluation and Mentor Proposal is appointed by the competent body on proposal of the Committee. The Committee consists of three or five members whose scientific activity belongs to the applicant's doctoral dissertation topic. At least one member of the committee is not a teacher on the study programme nor a Faculty's employee. The members of the Committee for Dissertation Topic Evaluation and Mentor Proposal must be teachers appointed to the research-and-teaching rank, researchers appointed to the scientific rank or appointed to an equivalent rank with regard to a member of the committee who has acquired his/her title abroad and top experts with the academic title of Doctor of Science. The president of the Committee for Dissertation Topic Evaluation and Mentor Proposal must be a teacher of the Faculty appointed to research-and-teaching rank. In case of dual mentorship, at least one mentor of the dissertation must be a teacher of the Faculty appointed to the research-and-teaching rank. A Professor Emeritus may also be a member of the Committee for Dissertation Topic Evaluation and Mentor Proposal. A committee list is compiled in the following order: committee president, study adviser and other members of the committee based on rank and age. As a rule, the doctoral thesis topic is assessed by a joint report of all members of the committee. A single member of the committee can give a separate opinion. The president of the Committee for Dissertation Topic Evaluation and Mentor Proposal may not be proposed as a mentor of the doctoral candidate.

The Committee for Dissertation Topic Evaluation and Mentor Proposal proposes the assessment of the original scientific contribution, the evaluation of the financial and organisational feasibility of research and the mentor within three months from the date of filing the application. The institution that pays for the doctoral student's tuition costs is entitled to participate in the selection of the dissertation topic. The doctoral thesis topic is assessed on publicly available University's forms.

The doctoral thesis topic and the mentor are examined by the Postgraduate Studies Committee. The Faculty Council approves the proposed topic and confirms the proposed mentor by the time the

doctoral candidate enrols into the 4th semester. The Faculty submits the topic and mentor for adoption to the University that must confirm both the topic and the mentor at the latest during the fourth semester.

The dissertation's topic and mentor may be changed only once.

4.7. Doctoral thesis assessment

Conditions for accepting a doctoral thesis

The Doctoral study is completed when all prescribed obligations are fulfilled and the dissertation is drawn up and presented in public. The necessary requirements for defending the dissertation are a total of 120 ECTS credits earned, 1 CC paper related to the doctoral research with a minimum of 20 ECTS credits (in which the candidate is the only one or one of the main authors) published (or approved for publication), 2 international conferences attended and 2 presentations delivered at the doctoral candidates' workshop.

Each doctoral candidate shall publish at least one publication in a journal having the impact factor greater than $IF_{75\%}$, i.e., a publication for which the doctoral candidate is awarded at least 20 ECTS credits.

Submitting the doctoral thesis

The doctoral candidate submits the comb bound doctoral thesis through the Registry to the Student Service accompanied by the mentor's written approval and opinion on conducted research and achieved original scientific contribution.

If the mentor refuses to give his/her approval for submitting the doctoral thesis, he/she must state the grounds for such a decision in writing within 15 days. In both cases, the mentor's explanation is delivered to the Committee.

The doctoral thesis is bound after its defence.

The electronic version of the doctoral thesis to be published on the Faculty's website fifteen days before the meeting of the competent body is delivered to the Faculty's library.

The doctoral candidate may submit the doctoral thesis for assessment after he/she has tested all semesters, fulfilled all prescribed obligations and paid for all tuition fees and doctoral thesis defence costs.

The doctoral thesis is submitted in the required number of comb bound and/or electronic copies according to the number of members of the Committee for Dissertation Topic Evaluation and Mentor Proposal plus an extra copy.

Possibilities for drawing up a doctoral thesis

The forms of doctoral theses are:

- Monograph.
- A collection of published scientific articles accompanied by a critical survey chapter, consisting of an introduction, discussion, conclusion and a comprehensive overview of relevant literature. The critical survey needs to place the results of the dissertation in the context of existing

scholarly insight. The scientific articles must be published after admission to the doctoral study. The scientific articles thus collected and proposed as a dissertation need to make a rounded whole composed of at least three articles in the field of doctoral research published in journals cited in the Web of Science database. At least two articles have to be published in a journal with an impact factor higher than median impact factor of the journal from the area of doctoral research. Each article can serve to qualify only one doctoral candidate, unless a special explanation in provided. The doctoral candidate has to be the main author in at least three of the articles. Every article needs to be accompanied by a statement of each author indicating the contribution of every single author as a quantitative contribution of the doctoral candidate expressed in shares. The collected articles need to present a new scientific contribution in relation to individual articles, which has been achieved during the doctoral study.

The doctoral thesis may be written either in Croatian or English.

The title, abstract and key words of the dissertation have to be written, in addition to the original, in the Croatian and English languages. The abstract should allow understanding of the dissertation objectives, methods of research, results and conclusions.

The dissertation's graphic layout is regulated by the University.

Dissertation Defence and Assessment Committee

The Dissertation Defence and Assessment Committee is established on the postgraduate study programme where the Doctor of Science degree is awarded. As soon as the doctoral thesis has been drawn up by the doctoral candidate and submitted to the mentor, the competent body, on proposal of the Postgraduate Studies Committee, appoints a Dissertation Defence and Assessment Committee. The Committee includes three or five members whose scientific activity belongs to the applicant's dissertation topic. At least one member is neither a teacher at the doctoral study nor an employee of the Faculty, and is, if possible, an employee of another Croatian or foreign university or related institution. The mentor may not be a member of the Dissertation Defence and Assessment Committee, except in extraordinary cases, where such a decision is made by the Senate on proposal of the Faculty Council, that is, the Council in charge for the field in question. Members of the Dissertation Defence and Assessment Committee have to be teachers appointed to the research-and-teaching rank, researchers appointed to the scientific rank or appointed to an equivalent rank with regard to a member of the committee who has acquired his/her title abroad and top experts with the academic title of Doctor of Science. The president of the Dissertation Defence and Assessment Committee must be a teacher of the Faculty appointed to research-and-teaching rank. A Professor Emeritus may also be a member of the Dissertation Defence and Assessment Committee. A committee list is compiled in the following order: committee president, other members of the committee based on rank and age. As a rule, the doctoral thesis topic is assessed by a joint report of all members of the committee. A single member of the committee can give a separate opinion. *The doctoral thesis is assessed on a publicly available form provided by the University.* Committee members and anyone who has been given access to the doctoral thesis must treat the data and insights from the dissertation with confidentiality until the publication of the dissertation assessment for the purpose of protecting the scientific contribution of the dissertation and intellectual property.

Doctoral thesis defence

The doctoral thesis is defended only once. The academic title conferred upon a student who has successfully completed the doctoral study and defended his/her dissertation is Doctor of Technical Science (abbreviated: dr.sc.) in a particular field. Upon completion of the doctoral study a Doctor of Science Diploma and a diploma supplement are issued. A thesis defence protocol is publicly available. Minutes of the dissertation defence are taken on a publicly available form provided by the University. In the past five years 83 doctoral theses have been successfully defended.

4.8. Available information on the doctoral study

Admission to the doctoral study programme is made by means of an open call for applications published both in Croatian and English in the Official Gazette of the Republic of Croatia, on the Faculty's website and in daily press.

All doctoral study related communications are published:

- on the websites of the Faculties: https://www.fsb.unizg.hr/; http://www.simet.unizg.hr/
- on the doctoral study website: doktorski.fsb.hr
- important notifications are sent by email to all students of the doctoral study
- for all information the following email address is available: doktorski@fsb.hr
- FMENA and FM have produced a leaflet in Croatian and English containing all relevant information about the study and contacts.

4.9. Distribution of funds

Funds collected from tuition fees enter the doctoral study fund and can be spent for doctoral study purposes according to an annual plan proposed by the Postgraduate Studies Committee and adopted by both competent bodies.

Admissible assigned costs are:

- Doctoral study publicity and promotion costs.
- Admission procedure costs.
- Student service material and other costs for the postgraduate doctoral study.
- Doctoral thesis proposal defence and doctoral thesis defence costs.
- Costs of the competitive fund for funding participation of doctoral candidates at conferences.
- Costs of the competitive fund for funding experimental research costs of doctoral candidates.
- Costs of the competitive fund for funding tuition fees and doctoral thesis draw up.
- Costs of the competitive fund for mobility of doctoral candidates.

There is an elaborate Ordinance on disposal of funds collected in the doctoral study fund.

Payment of honoraria from the funds collected through doctoral study tuition fees is not allowed.

4.10. Setting tuition fees

Costs of studying include tuition fees, research and publication costs, mobility costs, costs for defending the doctoral thesis proposal, drawing up and defending a doctoral thesis. Tuition fees are paid each semester at admission. A doctoral candidate may partly or wholly replace the tuition fees with delivering lectures at the undergraduate or graduate study, if a need arises. The doctoral candidate expresses his/her interest for teaching 6 months before the start of the semester or at

admission. The Faculties notify the Postgraduate Studies Committee about their needs for associates in teaching. A list of potential associates is sent to course leaders by the Committee and, if a candidate from the list or a course leader, agree upon holding exercises, an Agreement on teaching is entered into with the doctoral candidate. The doctoral candidate who during the semester achieves the prescribed number ECTS points and fulfils all the prescribed conditions for admission into a higher semester may be entitled to a tuition fee reduction. The Committee proposes the requirements and the reduction amount at least a year in advance. The decision establishing the reduction is made by the competent body. Should the doctoral candidate withdraw from the doctoral study once it has begun, the doctoral candidate, i.e., the payer of tuition fees is not entitled to reimbursement. Partial payment of the costs of studying (participation) is set by the competent bodies on proposal of the Committee. In case of dual doctorates and mobility according to the University's documents, the cost of studying is paid only at one institution. Costs of studying, publishing and mobility are covered according to the Costs of Studying Funding Plan.

5. Support to doctoral candidates and their progression

5.1. Admission quotas with respect to teaching and mentoring capacities

The Postgraduate Studies Committee has the duty to take care of the mentor's workload and performance and keep for each mentor a record of the number of admitted doctoral candidates and of the number of doctoral candidates who defended their doctoral thesis.

Every year the Committee makes only assessments on the basis of mentor's and doctoral candidate's annual report, by submitting a Work Report to the Faculty Council and University on a form provided by the University. The assessment criteria include: scientific production of teachers and doctoral candidates, quality of teaching, relevancy and quality of doctoral theses, statistical indicators concerning the duration of studying, statistical indicators of the annual number of new doctors in relation to the number of doctoral candidates and achieved international cooperation.

The qualitative competencies of mentors (defined by the number 16 of the Ordinance) are reviewed within the procedure of dissertation topic approval – the mentor's proposal is examined by the Committee, whereas according to the form DrSC01 the mentor's capacities are proved by published papers in the research topic of the dissertation proposal. The mentor is confirmed by the competent body (Faculty Council), followed by the Technical Area Council and by the University's Senate.

The workload of teachers was taken into account when defining the workload with a maximum of 2 course leadership equivalents. The workload of every single mentor 1:3 is not expressly limited, but the Committee should at its session certainly take into account the indications on over workload within the mentor approval procedure.

The total workload of all teachers is evaluated through the Human Resources Committee in the framework of promotion processes and analyses of the Faculty's teaching, scientific and professional activity in line with the activities of the FMENA's Quality Assurance System, whereas the Committee's members have access to these information on the teaching workload of all potential mentors of the Faculty at the Faculty Council's sessions by means of official reports.

5.2. Admission quotas and needs of the economy

The needs for a doctoral study were explained in the Detailed Overview of the Doctoral Study Programme, under Points 2.1 to 2.5. The total number of admitted students in relation to those who complete their studies is relatively low (below the threshold quota), therefore the Faculties are making efforts to increase the number of quality applicants/doctoral candidates, in particular those who participate in scientific research (EU research projects, CES and research projects of private companies).

5.3. Admission quotas and research needs

Applicants must submit a Financing Plan at admission. Costs of research, publishing and mobility are covered according to the Costs of Studying Funding Plan.

When evaluating the applications/at admission the Committee pays attention to the mode of financing giving preference to candidates who are financed through projects, that is, financed by the private sector.

5.4. Study advisers

Pursuant to the Ordinance each candidate has a study adviser until he/she is assigned a mentor. Once a year, the mentor shall submit a report on the doctoral student's performance to the competent body on a form prescribed by the University. Prior to the appointment of a mentor, the report in question is submitted by the study adviser. Every year the Committee makes only assessments on the basis of the mentor's (note: including study advisers who are assigned prior to the appointment of a mentor) and doctoral candidate's annual report, by submitting a Work Report to the Faculty Council and University on a form provided by the University.

5.5. Recruiting of talented doctoral candidates from home and abroad

The Article 6 of the Ordinance lays down in the call for applications for admission of candidates the criterion of the average grade of very good or higher obtained at the undergraduate and graduate level. Moreover, in the admission procedure of applicants who are competing for the position of assistants at the Faculty a high quality of grades (high average grade) is sought.

The admission of candidates who have been previously selected at calls for scientific projects also implies the process of selection of applicants of high quality.

Foreign nationals apply for admission to the study at equal conditions as Croatian nationals. There are 4 foreign nationals currently admitted to the doctoral study.

5.6. Selection of applicants

The selection procedure is defined by the Ordinance. It also prescribes the procedure for publication of Calls for admissions as well as the procedure for the evaluation of applicants. The selection of applicants for admission to the doctoral study is made between applicants who fulfil the Ordinance's criteria based on the criteria published in the call for admission of students. If the applicant has not yet fulfilled the conditions laid down in the Ordinance, but shows likelihood for their fulfilment by the time of admission, the applicant's application will be conditionally evaluated.

The criteria for evaluation of applicants include the educational attainment during graduate studies, proved interest in scientific research, number of papers published, referrals by professors and the potential mentor as well as proposal of the area of research.

An interview with the applicant as a prerequisite of the admission procedure is conducted by the Committee for the admission of candidates appointed by the Postgraduate Studies Committee.

At admission, the Committee clearly defines all necessary conditions for completion of studies within the planned timeframe, including the Plan for financing costs of studying.

5.7. Transparency of the selection procedure of applicants and complaints procedure

The names of the selected applicants, their qualifications as well as the names of persons who made the referrals are published on the doctoral study's website. The selected applicants shall submit all the required documentation for admission to the Student Service, whereas the competition documentations shall be deposited at the Student Service. Should the application be denied, the Admission Interview Committee will explain to every denied applicant their application's strengths and weaknesses and give recommendations for research plans.

5.8. Recognizing candidates' and applicants' prior achievements

At enrolment into the Doctoral Study Programme, the Committee may recognize up to 36 ECTS credits for attending lessons and 24 ECTS credits for the master's thesis to the applicant who has been awarded a Master of Science degree in the field of mechanical engineering, naval architecture, aeronautical engineering or metallurgy (Doctoral Study Programme, Admission requirements).

ECTS credits may be recognized for papers published before enrolment into the doctoral study, provided they are aligned with the topic of the doctoral thesis as well as for awards obtained before enrolment. Other prior achievements and knowledge achieved through non-formal and formal learning may be recognized by sending a request to the Committee for recognition of ECTS credits.

5.9. Ensuring institutional and supervisory support to doctoral candidates

The Ordinance prescribes a high level of supervisory and institutional support to candidates. The candidates' rights and obligations are defined in Point 6 of the Ordinance. Candidates are informed on all of their rights and obligations upon admission through:

- Ordinance released to the public on the Doctoral study website
- Programme released to the public on the Doctoral study website
- Interview with the Admission Committee
- Information obtained by the Postgraduate Studies Registry.

5.10. Institutional support to doctoral candidates

The institutional support for successful progression is ensured by providing advisors and mentors from the very beginning of the study. The Ordinance defines that each candidate has a study advisor up until a mentor is appointed (Point 13 Article 40 of the Ordinance).

The Postgraduate Studies Committee is in charge of monitoring and coordinating the postgraduate study programme and reports to the Faculty Council. The Committee's members, chair and deputy chair, as well as modules' heads are elected by the Faculty Council to a term of two years on proposal

of the Faculty's Dean. All heads of the doctoral study modules take part in the Committee's activities. The Student Service runs all administrative activities for the purpose of the doctoral study (Doctoral Study Programme, Point 8.3). Once a year, doctoral students and industry are surveyed for the purpose of collecting information on the level of satisfaction with the doctoral study and potential for improvement. Likewise, the Committee prepares an annual activities report for the previous period. According to the terms prescribed by the University of Zagreb, a Self-evaluation Report of the doctoral study is drawn up to outline the situation of the doctoral study and propose its improvement.

Given that the new doctoral study was launched a little more than a year ago, it is not possible to carry out the analysis for the past five-year period.

The Ordinance and the Study Programme lay down the doctoral candidates' minimum required results. Methods of monitoring quality of the doctoral study are defined by indicators (Programme, Point 8.1), which are, for the most part, the result of institutional support and doctoral candidates' prescribed obligations (publishing papers in journals, delivering presentations at conferences, mandatory presenting at doctoral schools).

Point 1.8 Description of the system of advising and guiding doctoral students through the doctoral study of the Study Programme outlines the obligations of the Committee, advisors and mentors. Point 1.9 of the Study Programme explains how doctoral candidates are offered the possibility to study both full-time and part-time.

For the purpose of interdisciplinarity, doctoral candidates may, upon explanation and mentor's content, as well as the Faculty's Council approval, partly attend lessons and partly conduct research at any constituent of the University of any other institution (Article 15 Point 5 of the Ordinance). If at least one attendee is not able to follow the lessons delivered in Croatian, the teaching for all attendees is delivered in English.

The curriculum of the doctoral study is shaped for each doctoral candidate according to the needs of his/her research. It is shaped by the doctoral candidate together with a study advisor or mentor in line with the study programme.

If the doctoral student pursues a joint (dual) doctoral degree, the programme of the doctoral study is shaped in such a way that the doctoral candidate spends a period of study at the Faculty and another period of study at another institution, with obligatory co-mentoring.

The Ordinance regulates mobility and the recognition of ECTS credits and grades earned at other institutions.

The Ordinance and the Programme define different possibilities of earning ECTS credits. The Ordinance (Point 8) ensures institutional support for verification of exams and other doctoral candidates' achievements.

Doctoral study competitive funds have been established to finance the participation of excellent doctoral candidates at conferences, ensure support for mobility and co-finance experimental exhibits for the purpose of writing a doctoral thesis.

The Faculty organizes doctoral workshops where doctoral candidates exchange their experiences and acquire presentation skills. The distinctive feature of the FMENA and FM doctoral workshops, as compared to similar workshops, is that doctoral candidates deliver an oral presentation of their work.

6. Programme and outcomes of doctoral study

6.1. Content and quality of the doctoral programme

All study modules are especially research-oriented, whereas certain scientific topics are closely linked to current scientific projects run at the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy with financial support of national science foundations (Foundation of the Ministry of Science, Education and Sports, Croatian Science Foundation, UKF etc.). Moreover, at international level of scientific promotion, by means of scientific networking and international relevance of certain topics, the doctoral study prepares scientific attendees to intensively participate in international research projects.

Moreover, by involving internationally recognised researchers to participate as teachers and co-leaders of certain courses in the programme delivery, international cooperation between the University of Zagreb and renowned international research centres as well as scientific cooperation between national researchers and their peers from the Europe's and world's most prestigious universities are furthermore promoted. Here should be emphasized that the indicated international cooperation intrinsically emerges from research activities conducted so far by teachers of the Faculty of Mechanical Engineering and Naval Architecture and Faculty of Metallurgy, and the doctoral study will give a further boost to even more cooperation and involvement of doctoral students and junior researchers in current and enlarged future cooperation possibilities, which is fully in line with the strategic guidelines of the University.

Scientific research and creation are the key components of the university doctoral study. The doctoral study programme is shaped for each doctoral student according to his/her research needs. The doctoral student shall publish papers in scientific journals, scientific conference proceedings and publicly defend the dissertation and its topic.

It is also expected that the concept of this new doctoral study will directly encourage the mobility of a younger generation of researchers, given that scientific excellence is put at the forefront of the research activity within the doctoral study. Such a concept naturally improves scientific networking and leads to joint research projects with peers from other European and world universities, and in accordance with the Research Strategy of the University of Zagreb, promotes the implementation of international projects and the enlargement of the University's scientific infrastructure.

In terms of teaching and research, FMENA and FM have a long-term cooperation with many prominent international universities. An active cooperation is currently underway with the following universities:

1. Universidade Tecnica de Lisboa, Portugal
2. Aalto University , Finland
3. University of Glasgow, UK

4. University of Trieste, Italy
5. University of Naples, Italy
6. University of Genoa, Italy
7. Budapest University of Technology and Economics, Hungary
8. Univerza v Ljubljani, Slovenia
9. Cranfield University, UK
10. Eindhoven University of Technology, Eindhoven, the Netherlands
11. Technische Universität Wien, Austria
12. Fak. tehničkih nauka, Novi Sad, Serbia
13. Tomas Bata University, Zlin, Czech Republic
14. Montan Univ. Leoben, Austria
15. Foi Skola, Kecskemet, Hungary
16. California State University, Northridge, USA
17. SLV and TU München, Germany
18. PTW Institute, Germany
19. University of Edirne, Turkey
20. Cumhuriyet University Sivas, Turkey
21. University of Aalborg, Denmark
22. Technische Universitat Darmstadt, Germany
23. University College Dublin, Ireland
24. Technical University Delft, the Netherlands
25. University of Massachusetts at Amherst, USA
26. Politecnico di Milano, Italy
27. University of Florence, Italy
28. ETH Zurich, Switzerland
29. Penn State University, State College PA, USA
30. Ecole Polytechnique Federal Lausanne, Switzerland
31. University of Duisburg-Essen, Germany
32. Univerza v Mariboru, Slovenia
33. Universitat Stuttgart, Germany
34. University of California Irvine, USA
35. Yale University, School of Engineering & Applied Science, USA
36. University of Nottingham, UK
37. Ruhr-University Bochum, Germany
38. KIT, Karlsruhe Institute of Technology, Germany
39. University of Notre Dame, USA
40. Tecnical University of Košice (Slovakia)

41. University of Krakow (Poland)
42. University of Beograd (Serbia)
43. University of Zenica (Bosnia and Herzegovina)
44. Institute for Metallurgy Zenica (Bosnia and Herzegovina)
45. The National Metallurgical Academy of Ukraine (NMetAU), Dnipropetrovsk (Ukraine)
46. Hashemite University, Jordan
47. Aalborg University, Denmark
48. Mohamed Premier University, Morocco
49. Instituto Superior Técnico, Portugal
50. Jozef Stefan International Postgraduate School, Slovenia
51. Xi'an Jiaotong University, China
52. Graz University of Technology, Austria

The measures listed below have made it possible to maintain long-term cooperation with the said universities as well as to establish new cooperation relations:

1. organisation of bilateral meetings to establish common views and align criteria for writing dissertations;
2. drawing up a co-directed doctoral degree dissertations (co-tutelle);
3. cooperation on joint international projects;
4. exchange of teachers and doctoral candidates;
5. signing cooperation agreements at the doctoral study level;
5. scientific and professional development of researchers and doctoral candidates at international universities;
7. international adaptability and compatibility of the programme and single doctoral study courses

Based on several components, the doctoral study programme supports and promotes international mobility and cooperation between doctoral candidates and teachers and in this way puts priority on cooperation with other higher education institutions.

In drawing up the doctoral study programme in question, a comparative analysis with doctoral programmes of highly ranked foreign universities was carried out. The analysis comprised the following universities: Graz University of Technology (TU Graz), Vienna University of Technology (TU Wien), Aalto University in Finland, Instituto Superior Tecnico from Portugal (IST) and Technical University of Denmark (DTU). The comparative analysis was carried out based on the following criteria: recommended duration of study, total number of ECTS credits, the number of ECTS credits allocated to required courses, the number of ECTS credits allocated to elective courses, the number of semesters with teaching activities, selection of candidates for study and study progress monitoring, date of defence of the dissertation topic in respect of the date of admission, the number of ECTS credits that must/may be earned through publishing, other ways of earning ECTS credits and other distinctive features of single doctoral programmes.

In all cases, a three-to-four-year study programme with a total number of ECTS credits that usually amounts to 180. Generally, 30 to 40 ECTS credits are allocated to teaching activities that usually take place only during the first two semesters. All doctoral programmes support international mobility through the European Credit Transfer and Accumulation System (ECTS) similarly to the doctoral programme. The candidate's progress is usually checked during transition from the first to the second year of study, by means of an exam before a committee or a public defence of the dissertation topic. The majority of doctoral programmes support the publishing activity during the drawing up of the dissertation.

A high degree of compatibility between the doctoral programme and compared doctoral programmes of highly ranked foreign universities was established.

The doctoral study enables interdisciplinarity, that is, the possibility to develop and implement interdisciplinary research. Pursuant to Article 40 of the Ordinance, to ensure the quality of the doctoral thesis, in case of interdisciplinary research, co-mentoring should be enabled. For the purpose of interdisciplinarity, doctoral candidates may, upon explanation and mentor's content, as well as the Faculty's Council approval, partly attend lessons and partly conduct research at any constituent of the University or any other institution.

In 2015, more final topics with interdisciplinary areas of research were approved. These are for example, the topic of the doctoral candidate M.S. “Validation of Numerical Models of Mechanical Behaviour of Animal and Human Bones”, the topic of the doctoral candidate I.T. “Damage Modelling on Nanoscale and Coupling with Discretization of Continuum”, and the topic of the doctoral candidate B.Ć. “Sustainable and Economically Viable Utilization of Biomass for Energy Conversion by Applying the Bio-refinery Concept”. The first two topics are an example of cooperation in the area of technical science and medicine, and the third topic is an example of cooperation in the area of technical and natural sciences. Pursuant to the Ordinance, the doctoral candidates are offered the possibility of dual mentorship.

In the past five years, three doctoral candidates obtained a dual Ph.D. degree.

6.2. Alignment of learning outcomes with the level 8.2 of the Croatian Qualifications Framework (CroQF)

The description of all courses of the doctoral study along with syllabus and leaders' competencies is located in the base of doctoral study courses and available in Croatian and English on the Doctoral study website. A detailed description of all courses with contents, objectives, learning outcomes, the way of teaching and sitting for exams, quality performance monitoring, necessary bibliography and competencies of course leaders is attached in the document FMENA_&_FM_modules_courses.pdf. Learning outcomes of single courses are designed at the sixth level of the Bloom's taxonomy according to research topics of each module. The modules, on the other hand, are designed with the aim to impact the development of single fields of technical science. The expected learning outcomes of the courses and programme directly contribute to:

- training of doctoral candidates for acquisition of scientific knowledge and skills
- training of doctoral candidates for independent research
- advancement through the doctoral study

- establishing cooperation with other higher education institutions upon completion of the study and
- acquisition of work competences.

Quality indicators of the doctoral study programme are:

- scientific production of teachers and doctoral students,
- quality of teaching,
- relevance and quality of doctoral dissertations,
- statistical data on duration of study,
- statistical data on the number of new holders of doctoral degrees in relation to the number of doctoral students annually,
- international cooperation accomplished,
- mobility of doctoral students,
- employability of new holders of doctoral degrees.

The fundamental compulsory course is common for all doctoral candidates and upon its completion doctoral candidates will know as follows:

- to explain the difference between a professional and a scientific research work,
- to define a scientific problem,
- to search databases, make a detailed bibliography overview,
- to pose hypotheses,
- to recognize hypotheses confirmation methods: experimental, theoretical, analytical, numerical
- to present and interpret research results,
- to analyse results errors,
- to write a scientific paper,
- to write a professional paper,
- to properly cite sources,
- to write an abstract,
- to manage a project cycle: ensuring resources, writing project proposals, working on the project, reporting,
- to communicate within the research community, to network,
- to choose a conference,
- to select a journal and creative methods of research work.

6.3. Learning outcomes of doctoral study

The learning outcomes of the doctoral study are logically and clearly linked to the learning outcomes of single teaching contents as exemplified by introducing the learning outcomes of the study into the learning outcomes of single courses.

At the level of single doctoral study modules, a comparison between the contents and learning outcomes of single courses was carried out and it was established that the compatibility of the doctoral study modules with many international universities has been achieved.

6.4. Programme alignment with the level 8.2 of the CroQF

The level 8.2 – acquiring a qualification shall include at least three years of scientific research in full-time equivalent, resulting in original articles with a relevant international peer review.

The doctoral candidate shall publish scientific papers in journals and conference proceedings. The doctoral candidate earns ECTS credits by regular fulfilment of obligations related to research, cooperation on national and international projects, industry-related research, international mobility and publishing works. Before defending his/her doctoral thesis, the doctoral candidate shall have at least one scientific paper related to the doctoral research (in which he/she is the only author or one of the main authors) published or approved for publishing in a journal with international review.

6.5. Alignment of teaching methods with the level 8.2 of the CroQF

Teaching methods (and distribution of ECTS credits) at different activities of the doctoral candidate are appropriate for level 8.2 of the CroQF and assure achievement of clearly defined learning outcomes. They are defined in the basic document Ordinance on the Doctoral Study Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering; Postgraduate Doctoral Study Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering Programme and information available on the doctoral study website.

The Ordinance on the doctoral study and related publicly available information establish the diversity of forms of teaching and earning ECTS credits necessary to complete the study and be awarded the title of Doctor of Science.

Mandatory forms of work in the framework of the doctoral study are research seminars, workshops and discussion groups, for the purpose of developing research work, critical thinking, acquiring of methodologies and general skills. Teaching in the form of lectures does not exceed 20% of the total workload foreseen by the study programme, expressed in accordance with the European Credit Transfer System (ECTS), which amounts to 36 ECTS credits.

The study programme includes, among other things, also

- credit value of each course determined in accordance with ECTS principles. One ECTS credit refers to the time necessary to fulfil teaching-related obligations (1 ECTS = 25 – 30 hours),
- forms of teaching and knowledge assessment for each course; as well as ways of earning ECTS credits. ECTS credits may be earned by defending one's own or verified research theoretical and experimental publication in public, research-oriented international mobility, holding a presentation at a scientific conference, science festival or exhibit, attending summer schools and similar teaching forms in the area of research, industry-related research, defending his/her dissertation topic in public, submission and acceptance of papers for publishing in an international review journal, i.e., conference proceedings at an internationally recognized conference, recognition of patents, making experimental exhibits and by receiving awards in the course of the studies. The ECTS credits are used to define minimum requirements and flexible evaluation of research achievements, rather than the time spent for their achievement.

The indicated procedures for earning ECTS credits are made publicly available to doctoral candidates under the web tab Delivery of the study programme in the framework of which the

Scientific research and creation are the key components of the university doctoral study. Mandatory forms of work in the framework of the doctoral study are research seminars, workshops and discussion groups, for the purpose of developing research work, critical thinking, acquiring of methodologies and general skills. **Example:** First Annual PhD Workshop, PhD Study of Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering, Zagreb, July 3rd, 2015.

Teaching in the form of lectures does not exceed 20% of the total workload foreseen by the study programme.

In terms of teaching and research, the doctoral study is organised in 11 modules. All modules are presented by research topics linked to the proposed fundamental elective and elective courses of the module.

The curriculum of the doctoral study is shaped for each doctoral candidate according to the needs of his/her research. It is shaped by the doctoral candidate together with a study advisor or mentor in line with the study programme. In the framework of fulfilling obligations under the course *Introduction to scientific research* in the first semester of the doctoral study, doctoral candidates in cooperation with professors make individual annual research plans. Examples of individual annual research plans are enclosed in the supporting documents.

6.8. International connections and mobility of teachers and doctoral candidates

The study programme of the Doctoral study Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering improves its quality through internationalisation and mobility and in particular on the basis of the following aspects:

Signed Agreements between FMENA and FM on international and interinstitutional cooperation, ERASMUS+ for student and staff mobility. At the level of the Faculties, 41 ERASMUS+ agreements have been signed, of which 13 agreements include mobility of doctoral study students. In 2015, two students took part in the ERASMUS+ traineeship (outbound) and one student took part in the ERASMUS+ study visit (inbound).

Teachers from foreign universities participate on an equal footing into the doctoral study in their capacity as course co-leaders as assigned in the framework of the Doctoral Study Programme and its ongoing verification and improvement. Co-leaders from international institutions have, by means of a letter of intent and approval of the head of the employing institution, accepted rights and obligations arising from their engagement on the doctoral study in question.

Doctoral study Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering passed through an international review. Promotion and information on mobility possibilities of doctoral candidates are systematically provided. Part of the collected tuition fees is earmarked for this purpose.

Not only ECTS credits are awarded for participation in international conferences, but delivering a presentation at two international conferences is a necessary requirement to apply for a doctoral thesis defence.

Pursuant to Article 54 of the Ordinance the doctoral thesis may be written either in Croatian or English.

If at least one attendee is not able to follow the lessons delivered in Croatian, the teaching for all attendees is delivered in English.

The implementer of the study programme carries out the entire scientific-and-research activity in line with the European Charter and Code of Conduct for Researchers and the principles thereof are implemented in running and monitoring the doctoral candidates' work.

III. Attachments

Legend for Table 1. Lecturers

***** = Workload in norm-hours at all 3 levels including workload at other institutions for the academic year 2014/15

A = number of research papers according to Law (NN/2005), in last 5 years
- A – journal papers indexed in WoS (CC and SCI-Expanded)
- B – journal papers indexed in other databases (e.g. Scopus)
- C – papers in domestic journals
- D – papers published in proceedings of international conferences)

B = number of citations of those papers in WoS (Scopus)

C = h-index according to WoS (Scopus)

Legend for Table 2. Supervisors and PhD students

***** = Total workload in norm-hours at all 3 levels including workload at other institutions for the academic year 2014/15

A = number of research papers according to Law (NN/2005), in last 5 years
- A – journal papers indexed in WoS (CC and SCI-Expanded)
- B – journal papers indexed in other databases (e.g. Scopus)
- C – papers in domestic journals
- D – papers published in proceedings of international conferences

B = number of citations of those papers in WoS (Scopus)

C = h-index according to WoS (Scopus)

D = number of leading or participations in international projects in last 5 years

E = number of leading or participations in national projects in last 5 years

F = number of papers resulting from PhD research. (total number for all categories A,B,C and D)

G = number of citations of those papers according to WoS (Scopus)

Table 1. Lecturers

Lecturer (name and surname/institution) and link to CROSBI	University position and field / branch of election	A	B	C	Course (and type of lecturing) at PhD level and total workload of the lecturer	Workload in NH*
Vesna Alar https://bib.irb.hr/lista-radova?autor=187083	Associate professor Technical science / mechanical engineering	A 12 B 12 C 0 D 16	10 (12)	5 (5)	Corrosion properties of materials	0
					Corrosion Protection	0
					Workload on 1. i 2. level	265
					Workload at other institution	0
					Total workload	265
Željko Alar https://bib.irb.hr/lista-radova?autor=210740	Assistant Professor Technical science / mechanical engineering	A 6 B 3 C 0 D 7	2 (2)	1 (1)	Mechanical properties of materials	0
					Measurement of force and hardness	0
					Workload on 1. i 2. level	294
					Workload at other institution	0
					Total workload	294
Jerolim Andrić http://bib.irb.hr/lista-radova?autor=219630	Associate professor Technical science / naval architecture	A 7 B 0 C 0 D 9	5 (8)	3 (5)	Advanced methods for ship structures modeling and analysis	66
					Feasibility and Reliability in Structural Design	0
					Multi-criteria optimization of thin-walled structures	0
					Workload on 1. i 2. level	416
					Workload at other institution	0
					Total workload	482
Đuro Barković Faculty of Geodesy University of Zagreb https://bib.irb.hr/lista-radova?autor=160935	Full professor Technical science / geodesy	A 0 B 4 C 5 D 11	0 (7)	1 (3)	Advanced Statistical Methods in Metrology	0
					Workload on 1. i 2. level	320
					Workload at other institution	30
					Total workload	350
Branko Bauer https://bib.irb.hr/lista-radova?autor=219641	Associate professor Technical science / mechanical engineering	A 3 B 3 C 6 D 6	0 (2)	0 (1)	Advanced procedures of primary shaping	0
					Simulation of casting processes	0
					Workload on 1. i 2. level	278
					Workload at other institution	0
					Total workload	278

Anita Begić Hadžipašić https://bib.irb.hr/lista-radova?autor=256881	Assistant Professor Technical sciences / metallurgy	A 3 B 3 C 1 D 7	10 (19)	2 (3)	Corrosion of structural steels	0
					Workload on 1. i 2. level	322,5
					Workload at other institution	0
					Total workload	322,5
Nenad Bojčetić https://bib.irb.hr/lista-radova?autor=186486	Associate professor Technical science / mechanical engineering	A 6 B 3 C 4 D 30	5 (6)	1 (1)	Data Management in Product Development - PLM	135
					Workload on 1. i 2. level	450
					Workload at other institution	0
					Total workload	585
Ivanka Boras https://bib.irb.hr/lista-radova?autor=187061	Full professor Technical science / mechanical engineering	A 1 B 2 C 0 D 7	16 (24)	3 (4)	Heat and mass transfer	33
					Advanced quantitative infrared thermography	66
					Workload on 1. i 2. level	200
					Workload at other institution	120
					Total workload	419
Carlo L. Bottasso Department of Mechanical Engineering, Technical University of Munich https://www.wind.mw.tum.de/?id=14	Full professor	A 17 B 6 C 0 D 33	43 (114)	18 (23)	Modeling, Control and Design of Wind Turbines	0
					Workload on 1. i 2. level	NP
					Workload at other institution	NP
					Total workload	NP
Željko Božić https://bib.irb.hr/lista-radova?autor=164265	Full professor Technical science / aeronautical, rocket and space engineering	A 2 B 1 C 0 D 6	2 (6)	2 (2)	Fatigue and fracture of structures	135
					Mechanical integrity of structures	0
					Workload on 1. i 2. level	450
					Workload at other institution	0
					Total workload	585
Danko Brezak https://bib.irb.hr/lista-radova?autor=235964	Assistant Professor Technical science / mechanical engineering	A 5 B 1 C 2 D 13	91 (103)	5 (6)	Computational Intelligence Algorithms (lectures)	45
					Computational Intelligence Algorithms (practicum)	21
					Advanced Computational Intelligence Systems (lectures)	45
					Advanced Computational Intelligence Systems (practicum)	21
					Workload on 1. i 2. level	290
					Workload at other institution	15
					Total workload	437

Ivan Brnardić http://bib.irb.hr/lista-radova?autor=234421	Assistant Professor Technical sciences / chemical engineering	A 8 B 3 C 0 D 3	14 (17)	10 (10)	Environmental emissions from iron and steel metallurgy	0
					Waste and by-products from the metallurgical industry	0
					Workload on 1. i 2. level	423,75
					Workload at other institution	0
					Total workload	423,75
Franjo Cajner http://bib.irb.hr/lista-radova?autor=76181	Full professor Technical science / mechanical engineering	A 2 B 7 C 1 D 15	2 (4)	3 (3)	Heat treatment and surface engineering	69
					Advanced tool materials	0
					Workload on 1. i 2. level	350
					Workload at other institution	0
					Total workload	419
Damir Ciglar http://bib.irb.hr/lista-radova?autor=121120	Full professor Technical science / mechanical engineering	A 2 B 0 C 1 D 9	1 (1)	2 (2)	Modelling and simulation of forming and machining processes	0
					Modern machine tools and their modules	0
					High efficiency machining and advanced machine tools	0
					Workload on 1. i 2. level	438
					Workload at other institution	
					Total workload	438
Mladen Crneković https://bib.irb.hr/lista-radova?autor=128460	Full professor (permanent) Technical science / mechanical engineering	A 0 B 0 C 2 D 4	2 (2)	1 (1)	Robotics	75
					Mobile robots	135
					Workload on 1. i 2. level	369
					Workload at other institution	0
					Total workload	579
Ivan Ćatipović https://bib.irb.hr/lista-radova?autor=275224	Assistant Professor Technical science / naval architecture	A 4 B 1 C 0 D 6	3 (5)	1 (3)	Offshore Structure Loading	135
					Theory of Seakeeping and Maneuverability	135
					Workload on 1. i 2. level	357
					Workload at other institution	0
					Total workload	627

Danko Ćorić http://bib.irb.hr/lista-radova?autor=203786	Associate professor Technical science / mechanical engineering	A 5 B 0 C 1 D 7	2 (0)	1	Functional materials (lectures + seminar)	105
					Mechanical properties of materials (lectures)	60
					Advanced metal construction materials (lectures + seminar)	57
					Workload on 1. i 2. level	385
					Workload at other institution	0
					Total workload	607
Predrag Ćosić https://bib.irb.hr/lista-radova?autor=94833	Full professor Technical science / mechanical engineering	A 4 B 0 C 0 D 13	12 (12)	3 (3)	Intelligent Process Planning (lectures)	0
					Sustainable Production (lectures)	0
					Workload on 1. i 2. level	346
					Workload at other institution	60
					Total workload	406
Lidija Ćurković http://bib.irb.hr/lista-radova?autor=189524	Full professor Technical science / mechanical engineering	A 29 B 7 C 0 D 27	85 (118)	12 (13)	Materials Science and Engineering (lecture)	72
					Nanostructured Materials	0
					Engineering Ceramics	0
					Introduction to Research (lecture)	9
					Workload at other institution	293
					Workload on 1. i 2. level	0
					Workload at other institution	374
Nastia Degiuli http://bib.irb.hr/lista-radova?autor=197130	Full professor Technical science / naval architecture	A 4 B 1 C 1 D 14	2 (7)	2 (2)	Mathematical methods in marine hydrodynamics	69
					CFD in ship design	69
					Workload on 1. i 2. level	384
					Workload at other institution	0
					Total workload	522
Joško Deur https://bib.irb.hr/lista-radova?autor=174020	Full professor Technical science / mechanical engineering	A 12 B 12 C 0 D 31	31 (88)	5 (11)	Digital control systems (seminar)	90
					Electrical drives control (seminar)	90
					Workload on 1. i 2. level	508
					Workload at other institution	0
					Total workload	688

Roko Deyhalla University of Rijeka, Faculty od engineering https://bib.irb.hr/pretrazivanje_rezultat?	Full professor Technical science / naval architecture	A 1 B 2 C 4 D 2	1 (1)	2 (3)	CFD in ship design Workload on 1. i 2. level Workload at other institution Total workload	69 NP NP 69
Slaven Dobrović http://bib.irb.hr/lista-radova?autor=203775	Associate professor Technical science / mechanical engineering	A 4 1 C 0 D 3	10 (8)	3 (17)	Energy and environmental protection Materials and Environment Workload on 1. i 2. level Workload at other institution Total workload	68 0 183 0 251
Natalija Dolić https://bib.irb.hr/lista-radova?autor=253433	Assistant Professor Technical sciences / metallurgy	A 11 B 3 C 0 D 23	11 (10)	2 (2)	Metallurgy of aluminum Workload on 1. i 2. level Workload at other institution Total workload	0 367,5 0 367,5
Damir Dović http://bib.irb.hr/lista-radova?autor=219652	Associate professor Technical science / mechanical engineering	A 2 B 0 C 2 D 9	8 (12)	2 (3)	Thermal apparatus and equipment Experimental methods in heat and mass transfer Workload on 1. i 2. level Workload at other institution Total workload	67,5 67,5 350 0 485
Nenad Drvar TOPOMATIKA d.o.o. Ilica 231, HR-10000 Zagreb, Hrvatska https://bib.irb.hr/lista-radova?autor=232564	Professional associate Technical science / mechanical engineering	A 1 B 0 C 0 D 1	2 (2)	2 (2)	Advanced Statistical Methods in Metrology Workload on 1. i 2. level Workload at other institution Total workload	0 NP NP NP
Nikša Dubreta https://bib.irb.hr/lista-radova?autor=172332	Associate professor Social sciences / sociology	A 3 B 3	0 (0)	0 (0)	Engineering Ethics and Social Responsibility Workload on 1. i 2. level Workload at other institution Total workload	135 311,5 105 551,5

Neven Duić https://bib.irb.hr/lista-radova?autor=179672 http://powerlab.fsb.hr/neven/	Full professor Technical science / mechanical engineering	A 45 B 14 C 0 D 87	8 (12)	2 (3)	Energy Planning Methods Modelling of Combustion and Radiative Heat Transfer Numerical Methods in Heat Transfer Introduction to research Workload on 1. i 2. level Workload at other institution Total workload	45 45 69 18 222 40 439
Ivo Džijan https://bib.irb.hr/lista-radova?autor=213515	Associate professor Technical science / mechanical engineering	A 0 B 1 C 0 D 1	0 (0)	2 (2)	Computational Fluid Dynamics Transients in pipelines Transport phenomena Workload on 1. i 2. level Workload at other institution Total workload	0 0 0 345 0 345
Goran Đukić https://bib.irb.hr/lista-radova?autor=213526	Associate professor Technical science / mechanical engineering	A 4 B 2 C 0 D 11	2 (2)	2 (3)	Operations Research in Logistics (lectures) Workload on 1. i 2. level Workload at other institution Total workload	0 330 90 420
Mario Essert http://bib.irb.hr/lista-radova?autor=73841	Full professor (permanent) Computer science / computinga	A 2 B 1 C 2 D 2	7 (7)	3 (2)	Scientific cloud computing (lectures) Scientific cloud computing (seminars) Distributed control systems (lectures) Distributed control systems (seminars) Workload on 1. i 2. level Workload at other institution Total workload	60 75 15 15 405 0 570
Mladen Franz https://bib.irb.hr/lista-radova?autor=76245	Emeritus Full professor Technical science / mechanical engineering	A 1 B 1 C 0 D 2	0 (0)	3 (3)	Mechanical properties of materials Workload on 1. i 2. level Workload at other institution Total workload	0 0 0 0

Antun Galović http://bib.irb.hr/lista-radova?autor=73826	Full professor Technical science / mechanical engineering	A 3 B 0 C 0 D 1	0 (0)	3 (4)	Heat and mass transfer	33
					Workload on 1. i 2. level	384
					Workload at other institution	0
					Total workload	417
Ivica Garašić http://bib.irb.hr/lista-radova?autor=235920&period=2007	Assistant Professor Technical science / mechanical engineering	A 3 B 3 C 0 D 11	12 (18)	1 (2)	Advanced welding and cutting processes	0
					Underwater welding and cutting	0
					Robotization and automation of welding	0
					Workload on 1. i 2. level	338
					Workload at other institution	0
					Total workload	338
Zoran Glavaš https://bib.irb.hr/lista-radova?autor=262725	Associate professor Technical sciences / metallurgy	A 5 B 5 C 2 D 19	1 (6)	1 (3)	Solidification and as-cast microstructure evolution	0
					Metallurgy of cast irons and steels	0
					Workload on 1. i 2. level	340,5
					Workload at other institution	0
					Total workload	340,5
Damir Godec https://bib.irb.hr/lista-radova?autor=210751	Associate professor Technical science / mechanical engineering	A 1 B 4 C 6 D 6	0 (0)	2 (3)	Advanced Polymer Processing	0
					Micro and nanotechnology	0
					Modern additive manufacturing of products	0
					Workload on 1. i 2. level	366
					Workload at other institution	0
					Total workload	366
Mirko Gojić https://bib.irb.hr/lista-radova?autor=63390	Full professor Technical sciences / metallurgy	A 12 B 5 C 2 D 20	33 (31)	4 (3)	Special Alloys	0
					Welding Metallurgy	0
					Workload on 1. i 2. level	340,5
					Workload at other institution	60
					Total workload	400,5
Lovorka Grgec Bermanec http://bib.irb.hr/lista-radova?autor=227254	Associate professor Technical science / mechanical engineering	A 0 B 2 C 2 D 5	2 (2)	1 (1)	Metrology of Heat and Process Quantities	0
					Methods for Estimating Measurement Uncertainty	69
					Workload on 1. i 2. level	240
					Workload at other institution	0
					Total workload	309

Krešimir Grilec https://bib.irb.hr/lista-radova?autor=215001	Associate professor Technical science / mechanical engineering	A 5 B 3 C 2 D 17	18 (25)	2 (2)	Materials Science and Engineering (lecture) Tribology Cellular materials Nanostructured Materials Workload on 1. i 2. level Workload at other institution Total workload	63 0 0 0 246 143 452
Marino Grozdek http://bib.irb.hr/lista-radova?autor=242262	Assistant Professor Technical science / mechanical engineering	A 1 B 0 C 0 D 0	9 (10)	4 (4)	Storage of thermal energy in buildings and industry Workload on 1. i 2. level Workload at other institution Total workload	45 320 0 365
Carlos Guedes Soares Instituto Superior Tecnico, Technical university of Lisbon, Portugal http://www.centec.tecnico.ulisboa.pt/en/centec/publications.aspx	Full professor Technical science / naval architecture	A 268	1658 (2181)	38 (47)	Structural Safety Workload on 1. i 2. level Workload at other institution Total workload	0 NP NP NP
Zvonimir Guzović https://bib.irb.hr/lista-radova?autor=113641 SCOPUS; WoS	Full professor Technical science / mechanical engineering	A 8 B 1 C 1 D 16	67 (96)	6 (6)	Selected chapters from the theory of turbomachines Methods for useful life estimation of power equipments and machines The flow, thermal and mechanical phenomena in turbomachines Workload on 1. i 2. level Workload at other institution Total workload	69 135 69 390 75 738
Tatjana Haramina https://bib.irb.hr/lista-radova?autor=297625	Associate professor Technical science / mechanical engineering	A 0,11 B 2,58 C 1,00 D 2,83	1 (1)	2 (2)	Polymeric materials (lectures) Composite materials (lectures) Workload on 1. i 2. level Workload at other institution Total workload	0 0 380 0 380

Martti Heinonen, VTT Technical Research Centre of Finland, Espoo, Finska	Associate professor Technical science / mechanical engineering	A 27 B 21 C 19 D 20	157 (41)	6 (4)	Mesuremnt and Calibration Systems	0
					Advanced Thermal Measurements	0
					Workload on 1. i 2. level	NP
					Workload at other institution	NP
					Total workload	NP
Zvonko Herold http://bib.irb.hr/lista-radova?autor=94844	Full professor Technical science / mechanical engineering	A 3 B 3 C 0 D 3	5 (10)	2 (4)	Design of High Strength Joints	135
					Workload on 1. i 2. level	360
					Workload at other institution	0
					Total workload	495
Tamara Holjevac Grgurić http://bib.irb.hr/lista-radova?autor=241081	Assistant Professor Technical sciences / chemical engineering	A 9 B 3 C 0 D 7	23 (19)	4 (4)	Phase transformations in metallic materials	0
					Advanced methods of metal research	0
					Workload on 1. i 2. level	343,5
					Workload at other institution	0
					Total workload	343,5
Damir Hršak http://bib.irb.hr/lista-radova?autor=223691	Full professor Technical sciences / metallurgy	A 1 B 1 C 1 D 8	2 (3)	2 (2)	Leaching processes in hydrometallurgy	0
					Workload on 1. i 2. level	435
					Workload at other institution	0
					Total workload	435
Domagoj Hruška University of Zagreb, Faculty of Economics and Business https://bib.irb.hr/lista-radova?autor=262253	Assistant Professor Social sciences / economics	A 0 B 2 C 0 D 10	0 (0)	0 (0)	Operations and Projects Management	0
					Workload on 1. i 2. level	NP
					Workload at other institution	NP
					Total workload	NP
Suzana Jakovljević https://bib.irb.hr/lista-radova?autor=233284	Assistant Professor Technical science / mechanical engineering	A 7 B 2 C 2 D 16	3 (7)	1 (2)	Physical Principles of Metrological Instruments and Microscopy	62
					Tribology	0
					Cellular materials	0
					Workload on 1. i 2. level	333
					Workload at other institution	12
					Total workload	407

Tomislav Jarak https://bib.irb.hr/lista-radova?autor=253466	Assistant Professor Technical science / mechanical engineering	A 2 B 0 C 0 D 14	1 (1)	5 (5)	Advanced Methods of Numerical Analysis of Structures Workload on 1. i 2. level Workload at other institution Total workload	135 280 0 415
Hrvoje Jasak https://bib.irb.hr/lista-radova?autor=199955	Associate professor Technical science / mechanical engineering	A 8 B 0 C 1 D 1 E 0 F 1 G 20	62 (67)	11 (12)	Numerical simulations in energy conversion processes The flow, thermal and mechanical phenomena in turbomachines Introduction to research Computational Aerodynamics Workload on 1. i 2. level Workload at other institution Total workload	44 44 6 44 375 0 513
Bojan Jerbić https://bib.irb.hr/lista-radova?autor=121164	Full professor (permanent) Technical science / mechanical engineering	A 3 B 9 C 16 D 1	13 (46)	3 (5)	Robotics (lectures) Designing Mechatronic Systems (lectures) Learning Methods and Programming of Autonomous Robotic Systems (lectures) Workload on 1. i 2. level Workload at other institution Total workload	60 75 135 624 0 894
Andrej Jokić http://bib.irb.hr/lista-radova?autor=253470	Associate professor Technical sciences / fundamental technical sciences	A 4 B 0 C 0 D 18	14 (29)	3 (7)	Distributed control (lectures) Distributed control (seminar) Optimization techniques in control (lectures) Optimization techniques in control (seminar) Workload on 1. i 2. level Workload at other institution Total workload	30 75 90 45 612 0 852
Marko Jokić bib.irb.hr/lista-radova?autor=263344	Assistant Professor Technical science / mechanical engineering	A 3 B 0 C 0 D 4	3 (4)	1 (1)	Structural Computational Dynamics Workload on 1. i 2. level Workload at other institution Ukupno opterećenje	0 225 0 225

Ivan Juraga https://bib.irb.hr/lista-radova?autor=15010	Full professor (permanent) Technical science / mechanical engineering	A 1 3 C 0 D 6	0 (1)	1 (2)	Corrosion properties of materials	0
					Failure analysis	0
					Workload on 1. i 2. level	234
					Workload at other institution	0
					Total workload	234
Tanja Jurčević Lulić http://bib.irb.hr/lista-radova?autor=187094	Full professor Technical science / mechanical engineering	A 1 B 2 C 0 D 7	1 (9)	1 (2)	Biomechanics	135
					Workload on 1. i 2. level	345
					Workload at other institution	75
					Total workload	555
Igor Karšaj http://bib.irb.hr/lista-radova?autor=242295	Associate professor Technical science / mechanical engineering	A 3 B 0 C 0 D 14	23 (28)	7 (7)	Continuum Mechanics	135
					Computational Biomechanics	135
					Workload on 1. i 2. level	330
					Workload at other institution	0
					Total workload	600
Josip Kasać http://bib.irb.hr/lista-radova?autor=240664	Associate professor Technical science / mechanical engineering	A 9 B 4 C 4 D 23	35 (52)	5 (6)	Nonlinear control systems (lectures)	60
					Nonlinear control systems (seminar)	30
					Methods of automatization (lectures)	30
					Methods of automatization (seminar)	15
					Workload on 1. i 2. level	507
					Workload at other institution	0
					Total workload	642
Janoš Kodvanj http://bib.irb.hr/lista-radova?autor=152374	Full professor Technical science / mechanical engineering	A 8 B 3 C 0 D 17	19 (26)	4 (4)	Experimental model techniques	0
					Workload on 1. i 2. level	300
					Workload at other institution	90
					Total workload	390
Darko Kozarac http://bib.irb.hr/lista-radova?autor=249416	Assistant Professor Technical science / mechanical engineering	A 12 B 6 C 2 D 16	22 (42)	3 (5)	Investigation of thermal processes in the IC engine	135
					Computationally supported development of the ICE and vehicles	135
					Workload on 1. i 2. level	434
					Workload at other institution	0
					Total workload	704

Hrvoje Kozmar https://bib.irb.hr/lista-radova?autor=210762	Associate professor Technical science / mechanical engineering	A 15 B 3 C 0 D 10	73 (83)	7 (8)	Wind and structures	135
					Environmental aerodynamics	135
					Workload on 1. i 2. level	296
					Workload at other institution	0
					Total workload	566
Stjepan Kožuh https://bib.irb.hr/lista-radova?autor=248081	Associate professor Technical sciences / metallurgy	A 9 B 5 C 2 D 17	26 (31)	3 (3)	Advanced Physical Metallurgy	0
					Welding Metallurgy	0
					Phase transformations in metallic materials	0
					Workload on 1. i 2. level	308
					Workload at other institution	0
					Total workload	308
Zoran Kožuh http://bib.irb.hr/lista-radova?autor=186521	Full professor Technical science / mechanical engineering	A 10 B 6 C 1 D 12	1 (3)	1 (1)	Advanced welding and cutting processes	0
					Robotization and automation of welding	0
					Adhesive bonding in fabrication	0
					Workload on 1. i 2. level	314
					Workload at other institution	0
					Total workload	314
Goran Krajačić http://bib.irb.hr/lista-radova?autor=288976	Assistant Professor Technical science / mechanical engineering	A 15 B 8 C 0 D 42	243 (266)	11 (12)	Energy Planning Methods	45
					Workload on 1. i 2. level	169
					Workload at other institution	0
					Total workload	214
Zoran Kunica https://bib.irb.hr/lista-radova?autor=162390	Full professor Technical science / mechanical engineering	A 0 B 0 C 1 D 8	0 (0)	1 (2)	Intelligent production processes (lectures and seminars)	135
					Workload on 1. i 2. level	597
					Workload at other institution	0
					Total workload	732
Darko Landek http://bib.irb.hr/lista-radova?autor=213574	Associate professor Technical science / mechanical engineering	A 0 B 10 C 2 D 16	1 (17)	4 (3)	Modeling in Materials Research	69
					Thermodynamic and structure of materials	0
					Workload on 1. i 2. level	237
					Workload at other institution	42
					Total workload	348

Ladislav Lazić https://bib.irb.hr/lista-radova?autor=105552	Full professor Technical sciences / metallurgy	A 1 B 11 C 1 D 20	0 (1)	3 (4)	Mathematical modelling of industrial furnaces	0
					Energy efficiency of industrial furnaces	0
					Workload on 1. i 2. level	389,5
					Workload at other institution	0
					Total workload	389,5
Dragutin Lisjak http://bib.irb.hr/lista-radova?autor=186506	Associate professor Technical science / mechanical engineering	A 5 B 4 C 0 D 10	3 (3)	1 (3)	Intelligent Information Systems (lectures)	135
					Maintenance Managament (lectures)	135
					Workload on 1. i 2. level	510
					Workload at other institution	0
					Total workload	780
Dražen Lončar https://bib.irb.hr/lista-radova?autor=197152	Associate professor Technical science / mechanical engineering	A 8 B 0 C 0 D 1 G 14	32 (37)	4 (6)	Dynamics and control of thermo-hydraulic processes	135
					Workload on 1. i 2. level	527
					Workload at other institution	296
					Total workload	958
Martina Lovrenić-Jugović http://bib.irb.hr/lista-radova?autor=242304	Assistant Professor Technical science / mechanical engineering	A 1 B 4 C 0 D 9	2 (6)	1 (2)	Theory of metal forming process	0
					Mathematical Modelling of Industrial Furnaces	0
					Workload on 1. i 2. level	300
					Workload at other institution	0
					Total workload	300
Zoran Lulić http://bib.irb.hr/lista-radova?autor=197163	Full professor Technical science / mechanical engineering	A 5 B 14 C 0 D 31	14 (16)	2 (2)	Alternative Drives of Motor Vehicles	135
					Engines and vehicles - selected topics	135
					Workload on 1. i 2. level	250
					Workload at other institution	50
					Total workload	570
Henrik Lund Department of Development and Planning, University of Aalborg http://www.en.plan.aau.dk/henriklund/	Full professor	A 50 B 0 C 0 D 1	915 (4376)	29 (41)	Energy Planning Methods	45
					Workload on 1. i 2. level	NP
					Workload at other institution	NP
					Total workload	45

Davor Ljubas http://bib.irb.hr/lista-radova?autor=213585	Associate professor Technical science / mechanical engineering	A 6 B 2 C 0 D 6	88 (89)	4 (4)	Energy and environmental protection Workload on 1. i 2. level Workload at other institution Total workload	67 176 0 243
Boris Ljubenkov University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture https://bib.irb.hr/lista-radova?autor=215023	Associate professor Technical science / naval architecture	A 4 B 2 C 0 D 0	1 (1)	1 (1)	Shipbuilding production process methods and systems Shipbuilding management Workload on 1. i 2. level Workload at other institution Total workload	0 0 NP NP NP
Dubravko Majetić https://bib.irb.hr/lista-radova?autor=162406	Full professor Technical science / mechanical engineering	A 2 B 1 C 2 D 13	13 (18)	3 (5)	Computational Intelligence Algorithms (lectures+seminar) Nanorobotics (lectures+seminar) Advanced Computational Intelligence Systems (lectures+seminar) Workload on 1. i 2. level Workload at other institution Total workload	69 105 66 495 60 795
Šime Malenica Bureau Veritas, Pariz, Francuska https://bib.irb.hr/lista-radova?autor=212200	Associate professor Technical science / naval architecture	A 12 B 0 C 2 D 45	141 (133)	5 (5)	Mathematical methods in marine hydrodynamics Hydroelasticity of ships and marine structures Workload on 1. i 2. level Workload at other institution Total workload	0 0 NP NP NP
Dorian Marjanović http://bib.irb.hr/lista-radova?autor=83344	Full professor (permanent) Technical science / mechanical engineering	A 4 B 14 C 0 D	9 (28)	2 (13)	Data Management in Product Development - PLM Design theories Workload on 1. i 2. level Workload at other institution Ukupno opterećenje	0 0 360 90 450
Damir Markučič http://bib.irb.hr/lista-radova?autor=175043	Full professor Technical science / mechanical engineering	A 4 B 1 C 0 D 8	3 (4)	2 (1)	Nondestructive Evaluation Methods Workload on 1. i 2. level Workload at other institution Total workload	0 308 0 308

Pierangelo Masarati Department of Aerospace Engineering of Politecnico di Milano https://home.aero.polimi.it/masarati	Associate professor	A 40 B 0 C 0 D 68	83 (297)	8 (14)	Rotary Wing Aeroelasticity Workload on 1. i 2. level Workload at other institution Total workload	0 0 0 0
Božidar Matijević http://bib.irb.hr/lista-radova?autor=171386	Full professor Technical science / mechanical engineering	A 2 B 9 C 0 D 9	 3 (10)	 0 (1)	Heat Treatment and Surface Engineering Workload on 1. i 2. level Workload at other institution Total workload	66 220 0 286
Jožef Medved Naravoslovnotehniška fakulteta Univerza v Ljubljani http://izumbib.izum.si/bibliografije/Y20160309145149-A3528803.html	Full professor Technical sciences / metallurgy	A 7 B 9 C 8 D 13	 93 (111)	 6 (6)	Theory of Metallurgical Processes Workload on 1. i 2. level Workload at other institution Total workload	0 NP 216 216
Primož Mrvar Naravoslovnotehniška fakulteta Univerza v Ljubljani http://izumbib.izum.si/bibliografije/Y20160309144940-A4654691.html	Full professor Technical sciences / metallurgy	A 3 B 6 C 7 D 10	46 (60)	6 (6)	Solidification and as-cast microstructure evolution Innovative processes of metal casting Workload on 1. i 2. level Workload at other institution Total workload	0 0 NP 216 216
Vedran Mudronja https://bib.irb.hr/lista-radova?autor=32641	Full professor (permanent) Technical science / mechanical engineering	A 4 B 0 C 0 D 12	 3 (2)	 1 (2)	Fundamental metrology Dimensional measurements - advanced methods Workload on 1. i 2. level Workload at other institution Workload at other institution Total workload	0 135 0 304 0 439

Branko Novaković https://www.researchgate.net/profile/Branko_Novakovic	Professor emeritus Technical science / mechanical engineering	A 4 B 9 C 1 D 8	14 (19)	6 (8)	Methods of automatization (lectures) (seminar) Nanorobotics (lectures) (seminar) Nonlinear control systems (lectures) (seminar) Workload on 1. i 2. level Workload at other institution Total workload	60 30 75 30 30 15 0 0 240
Joško Parunov http://bib.irb.hr/lista-radova?autor=206782	Full professor Technical science / naval architecture	A 10 B 4 C 1 D 14	27 (54)	5 (9)	Advanced methods of fatigue assessment of welded ship structures Stochastic modelling of loads of ship structures Workload on 1. i 2. level Workload at other institution Total workload	135 135 330 45 645
Danijel Pavković https://bib.irb.hr/lista-radova?autor=232586	Assistant Professor Technical science / mechanical engineering	A 10 B 1 C 0 D 17	69 (224)	7 (9)	Digital control systems (lectures) Electrical drives control (lectures) Sensorics (lectures) Selected topics of computer control (lectures) Workload on 1. i 2. level Workload at other institution Total workload	45 45 72 72 410 0 644
Joško Petrić http://bib.irb.hr/lista-radova?autor=152396&period=2007	Full professor (permanent) Technical science / mechanical engineering	A 2 B 0 C 1 D 8	18 (33)	5 (6)	Designing mechatronic systems (lectures) Hydraulics and pneumatics – selected topics (lectures) Workload on 1. i 2. level Workload at other institution Total workload	60 135 758 0 953
Robert Pezer http://bib.irb.hr/lista-radova?autor=213706	Associate professor Natural sciences / physics	A 1 B 0 C 0 D 0	0 (0)	9 (9)	Advanced physical metallurgy Workload on 1. i 2. level Workload at other institution Ukupno opterećenje	0 400 0 400

Pero Prebeg https://bib.irb.hr/lista-radova?autor=257590	Assistant Professor Technical science / naval architecture	A 2 B 0 C 0 D 6	4 (5)	2 (4)	Multi-criteria optimization of thin-walled structures Workload on 1. i 2. level Workload at other institution Total workload	0 282 0 282
Vera Rede https://bib.irb.hr/lista-radova?autor=165705	Associate professor Technical science / mechanical engineering	A 1 B 2 C 1 D 9	0 (0)	1 (1)	Materials Selection and Product Development Methods of materials characterization Advanced metal construction materials Workload on 1. i 2. level Workload at other institution Total workload	35 33 40 250 0 358
Stoja Rešković http://bib.irb.hr/lista-radova?autor=57806	Associate professor Technical sciences / metallurgy	A 4 B 2 C 0 D 8	0 (2)	1 (1)	Theory of metal forming process Deformation properties of metals and alloys Workload on 1. i 2. level Workload at other institution Total workload	0 0 240 0 240
Smiljko Rudan https://bib.irb.hr/lista-radova?autor=216136	Associate professor Technical science / naval architecture	A 4 B 3 C 0 D 7	1 (2)	1 (5)	Advanced methods for ship structures modeling and analysis Ships collisions and groundings Workload on 1. i 2. level Workload at other institution Total workload	69 0 380 0 449
Biserka Runje https://bib.irb.hr/lista-radova?autor=137741	Full professor Technical science / mechanical engineering	A 10 B 0 C 5 D 15	8 (10)	3 (3)	Advanced Statistical Methods in Metrology Methods for Estimating Measurement Uncertainty Workload on 1. i 2. level Workload at other institution Total workload	135 66 318 0 519
Zdravko Schauperl https://bib.irb.hr/lista-radova?autor=186464	Full professor Technical science / mechanical engineering	A 6 B 0 C 0 D 7	3 (20)	2 (4)	Methods of material characterisation Composite materials Workload on 1. i 2. level Workload at other institution Total workload	48 48 350 0 446

Daniel Rolph Schneider http://bib.irb.hr/lista-radova?autor=204335	Full professor Technical science / mechanical engineering	A 8 B 2 C 1 D 8	20 (26)	5 (5)	Development of modern thermal power plants	135
					Modelling of Combustion and Radiative Heat Transfer	45
					Workload on 1. i 2. level	281
					Workload at other institution	0
					Total workload	461
Damir Semenski http://bib.irb.hr/lista-radova?autor=121105	Full professor (permanent) Technical science / mechanical engineering	A 4 B 0 C 0 D 6	4 (4)	5 (6)	Theory of elasticity	135
					Optical methods of mechanics	0
					Workload on 1. i 2. level	322
					Workload at other institution	0
					Total workload	457
Ivo Senjanović https://bib.irb.hr/lista-radova?autor=320461	Academician Technical science / naval architecture	A 18 B 2 C 14 D 15	75 (71)	5 (5)	Hydroelasticity of ships and marine structures	135
					Workload on 1. i 2. level	0
					Workload at other institution	0
					Total workload	135
Sanja Singer http://bib.irb.hr/lista-radova?autor=155344	Full professor Natural sciences / mathematics	7	20 (24)	5 (5)	Numerical Linear Algebra	135
					Workload on 1. i 2. level	285
					Workload at other institution	120
					Total workload	540
Ivica Skozrit http://bib.irb.hr/lista-radova?autor=253556	Assistant Professor Technical science / mechanical engineering	A 2 B 2 C 2 D 5	2 (6)	3 (2)	Theory of plasticity	60
					Workload on 1. i 2. level	360
					Workload at other institution	0
					Total workload	420
Vedran Slapničar https://bib.irb.hr/lista-radova?autor=203716	Assistant Professor Technical science / naval architecture	A 2 B 0 C 0 D 3	1 (0)	1 (2)	Profitable ship design	0
					Probabilistic approach to damage stability	0
					Workload on 1. i 2. level	422
					Workload at other institution	0
					Total workload	422

Ljerka Slokar http://bib.irb.hr/lista-radova?autor=262714	Assistant Professor Technical sciences / metallurgy	A 2 B 2 C 2 D 12	12 (13)	3 (3)	Advanced physical metallurgy	0
					Advanced methods of metal research	0
					Special Alloys	0
					Workload on 1. i 2. level	377,5
					Workload at other institution	4,5
					Total workload	382
Ivica Smojver https://bib.irb.hr/lista-radova?autor=190896	Full Professor Scientific field of Aeronautics / rocket and space technology, scientific branch Design of Aircraft	A 4 B 0 C 0 D 9	31 (38)	5 (4)	Selected Topics of Strength of Aeronautical Structures	45
					Mechanics of Composite Structures	45
					Workload on 1. i 2. level	465
					Workload at other institution	0
					Total workload	555
Tahir Sofilić http://bib.irb.hr/lista-radova?autor=057731	Assistant Professor Technical sciences / interdisciplinary engineering	A 8 B 2 C 4 D 5	9 (12)	4 (2)	Environmental emissions from iron and steel metallurgy	0
					Waste and by-products from the metallurgical industry	0
					Workload on 1. i 2. level	454
					Workload at other institution	0
					Ukupno opterećenje	454
Vladimir Soldo https://bib.irb.hr/lista-radova?autor=213642	Associate professor Technical science / mechanical engineering	A 1 B 0 C 0 D 4	0 (0)	1 (1)	Cooling-heating processes with heat pumps	68
					Workload on 1. i 2. level	252
					Workload at other institution	80
					Total workload	400
Jurica Sorić http://bib.irb.hr/lista-radova?autor=51293	Full professor (permanent) Technical science / mechanical engineering	A 6 B 4 C 2 D 15	5 (7)	9 (10)	Introduction to research	9
					Numerical Methods of Nonlinear Analysis of Structures	75
					Advanced Methods of Numerical Analysis of Structures	45
					Modeling from Macro- to Nano-Scale	60
					Theory of plasticity	75
					Workload on 1. i 2. level	315
					Total workload	579

Josip Stepanić http://bib.irb.hr/lista-radova?autor=213690	Associate professor Technical science / mechanical engineering	A 4 B 1 C 2 D 6	4 (1)	2 (2)	Physcal Principles of Metrology Instruments and Microscopy (Lectures) Workload on 1. i 2. level Workload at other institution Total workload	72 406 0 478
Aleksandar Sušić http://bib.irb.hr/lista-radova?autor=227366	Associate professor Technical science / mechanical engineering	A 0 B 0 C 0 D 7	0 (0)	0 (0)	Vibrations of systems with clearances Workload on 1. i 2. level Workload at other institution Total workload	0 300 0 300
Mario Šavar http://bib.irb.hr/lista-radova?autor=128561	Full professor Technical science / mechanical engineering	A 2 B 0 C 0 D 0	1 (74)	2 (2)	Heat and mass transfer Transients in pipelines Transport phenomena Workload on 1. i 2. level Workload at other institution Total workload	33 0 0 521 0 554
Mladen Šercer https://bib.irb.hr/lista-radova?autor=77160	Full professor (permanent) Technical science / mechanical engineering	A 4 B 7 C 9 D 16	4 (10)	4 (4)	Advanced procedures of primary shaping Advanced Polymer Processing Micro and nanotechnology Workload on 1. i 2. level Workload at other institution Total workload	0 0 0 540 48 588
Ante Šestan https://bib.irb.hr/lista-radova?autor=155886	Full professor Technical science / naval architecture	A 4 B 0 C 0 D 8	8 (15)	2 (3)	Design of marine propulsion systems Ship propulsion system vibrations Workload on 1. i 2. level Workload at other institution	0 0 580 580
Željko Šitum https://bib.irb.hr/lista-radova?autor=204324	Full professor Technical science / mechanical engineering	A B 3 C 1 D 10	8 (9)	5 (5)	Pneumatic and hydraulic servo systems Workload on 1. i 2. level Workload at other institution Total workload	135 481 0 616

Nedeljko Štefanić https://bib.irb.hr/lista-radova?autor=156176	Full professor Technical science / mechanical engineering	A 1 B 3 C 0 D 7	0 (9)	2 (3)	Introduction to research (lectures)	15
					Operations and Projects Management (lectures)	135
					Design and analysis of experiments (lectures)	135
					Workload on 1. i 2. level	518
					Workload at other institution	0
					Total workload	803
Mario Štorga http://bib.irb.hr/lista-radova?autor=219696	Associate professor Technical science / mechanical engineering	A 11 B 1 C 0 D 31	17 (23)	4 (4)	Complex socio-technical systems (lecturers)	60
					Complex socio-technical systems (seminar)	75
					Design theories (seminar)	45
					Workload on 1. i 2. level	345
					Workload at other institution	0
					Total workload	525
Anita Štrkalj http://bib.irb.hr/lista-radova?autor=289540	Associate professor Technical sciences / metallurgy	A 6 B 8 C 2 D 20	9 (16)	3 (3)	Modern methods of chemical analysis in metallurgy	0
					Workload on 1. i 2. level	365
					Workload at other institution	0
					Total workload	365
Srećko Švaić https://bib.irb.hr/lista-radova?autor=48663	Full professor (permanent) Technical science / mechanical engineering	A 1 B 0 C 1 D 6	12 (56)	2 (3)	Thermal apparatus and equipment	20
					Experimental methods in heat and mass transfer	20
					Advanced quantitative infrared thermography	25
					Workload on 1. i 2. level	280
					Workload at other institution	NP
					Total workload	345
Josip Tambača University of Zagreb, PMF, Department of Mathematics https://bib.irb.hr/lista-radova?autor=229006	Full professor Natural sciences / mathematics	9	33 (38)	9 (10)	Equations of Mathematical Physics	0
					Workload on 1. i 2. level	360
					Workload at other institution	0
					Total workload	360

Zdravko Terze https://bib.irb.hr/lista-radova?autor=187140	Full professor (permanent) Technical sciences / aeronautical engineering, rocket and space technologies	A 5 B 1 C 10 D 7	4 (5)	4 (3)	Geometric mechanics	135
					Rotary Wing Aeroelasticity	0
					Modeling, Control and Design of Wind Turbines	0
					Workload on 1. i 2. level	590
					Workload at other institution	0
					Total workload	725
Zdenko Tonković https://bib.irb.hr/lista-radova?autor=187173	Full professor Technical science / mechanical engineering	A 7,31 B 10,86 C 0,75 D 19,73	26 (37)	5 (6)	Modeling from Macro- to Nano-Scale	0
					Fracture Mechanics, Damage and Fatigue	135
					Numerical Methods of Nonlinear Analysis of Structures	0
					Workload on 1. i 2. level	150
					Workload at other institution	0
					Total workload	285
Željko Tuković http://bib.irb.hr/lista-radova?autor=213664	Associate professor Technical science / mechanical engineering	A 11 B 0 C 0 D 0	78 (89)	6 (7)	Selected chapters from the theory of turbomachines	66
					Numerical simulations in energy conversion processes	66
					Computational Aerodynamics	66
					Workload on 1. i 2. level	360
					Workload at other institution	0
					Total workload	558
Toma Udiljak http://bib.irb.hr/pretrazivanje_rezultat/90974	Full professor (permanent) Technical science / mechanical engineering	A 6 B 0 C 0 D 9	13 (18)	5 (6)	Modelling and simulation of forming and machining processes	0
					Automated manufacturing systems	0
					High efficiency machining and advanced machine tools	0
					Workload on 1. i 2. level	481
					Workload at other institution	0
					Ukupno opterećenje	481

Zdravko Virag https://bib.irb.hr/lista-radova?autor=73376	Full professor (permanent) Technical science / mechanical engineering	A 3 B 4 C 9 D 3	4 (4)	2 (4)	Heat and mass transfer Computational Fluid Dynamics Biological flows Workload on 1. i 2. level Workload at other institution Total workload	36 0 0 305 0 341
Milan Vrdoljak http://bib.irb.hr/lista-radova?autor=240675	Associate professor Technical sciences / aeronautical engineering, rocket and space technologies	A 1 B 1 C 2 D 5	0 (0)	0 (0)	Modeling, simulation and control of flying objects Rotor Aerodynamics Workload on 1. i 2. level Workload at other institution Total workload	0 0 471 0 471
Krešimir Vučković http://bib.irb.hr/lista-radova?autor=236030	Assistant Professor Technical science / mechanical engineering	A 2 B 2 C 5 D 2	1 (2)	2 (2)	Theory of gearing (lectures) Theory of gearing (laboratoy) Workload on 1. i 2. level Workload at other institution Total workload	120 5 300 0 425
Milan Vujanović https://bib.irb.hr/lista-radova?autor=273685	Assistant Professor Technical science / mechanical engineering	A 11 B 02 C 0 D 28	66 (85)	5 (6)	Numerical Methods in Heat Transfer Modelling of Combustion and Radiative Heat Transfer Workload on 1. i 2. level Workload at other institution Total workload	0 0 160 0 160
Hinko Wolf http://bib.irb.hr/lista-radova?autor=162353	Full professor Technical science / mechanical engineering	A 3 B 0 C 0 D 7	6 (6)	3 (4)	Dynamic of Machines Nonlinear dynamics Workload on 1. i 2. level Workload at other institution Total workload	135 0 530 0 665
Davor Zorc https://bib.irb.hr/lista-radova?autor=111286	Full professor Technical science / mechanical engineering	A 2 B 0 C 1 D 4	6 (11)	1 (4)	Sensorics (lectures) Selected topics of computer control (lectures) Workload on 1. i 2. level Workload at other institution Total workload	63 63 309 0 435

Zdenka Zovko Brodarac https://bib.irb.hr/lista-radova?autor=248092	Associate professor Technical sciences / metallurgy	A 7 B 7 C 0 D 25	4 (10)	1 (2)	Solidification and as-cast microstructure evolution	0
					Aluminum alloys casting	0
					Innovative processes of metal casting	0
					Workload on 1. i 2. level	243,5
					Workload at other institution	0
					Total workload	243,5
Davor Zvizdic http://bib.irb.hr/lista-radova?autor=114473	Full professor (permanent) Technical science / mechanical engineering	A 10 B 10 C 7 D 23	23 (21)	3 (3)	Advanced Thermal Measurements	0
					Mesuremnt and Calibration Systems	0
					Fundamental metrology	0
					Mjeriteljstvo toplinskih i procesnih veličina	0
					Workload on 1. i 2. level	300
					Workload at other institution	0
					Total workload	300
Dragan Žeželj http://bib.irb.hr/lista-radova?autor=227381	Assistant Professor Technical science / mechanical engineering	A 5 B 1 C 0 D 5	1 (2)	1 (1)	Sliding-rolling contacts	75
					Workload on 1. i 2. level	365
					Workload at other institution	120
					Total workload	560
Irena Žmak http://bib.irb.hr/lista-radova?autor=228900	Assistant Professor Technical science / mechanical engineering	A 0 B 1 C 1 D 4	1 (1)	1 (1)	Materials and Environment	73
					Modeling in Materials Research	40
					Materials Selection and Product Development	0
					Workload on 1. i 2. level	450
					Workload at other institution	16
					Total workload	579

Table 2. Supervisors and PhD students

Mentor (name and surname / institution) and link to CROSBI	University position and field / branch of election	Total workload in NH*	A	B	C	D	E	PhD student (initials) and title of the thesis	F	G	Number of PhD students completed PhD study / number of PhD student failed to complet PhD study
Branko Bauer https://bib.irb.hr/lista-radova?autor=219641	Associate professor Technical science / mechanical engineering	278	A 3 B 3 C 6 D 6	0 (2)	0 (1)	0	0	IMP: Influence of Cooling Rate and Addition of Cerium and Bismuth on Graphite Morphology in Heavy-Section Spheroidal Graphite Iron Castings	6	0 (0)	0 (0)
Lidija Ćurković http://bib.irb.hr/lista-radova?autor=189524	Full professor Technical science / mechanical engineering	374	A 29 B 7 C 0 D 27	85 (118)	12 (13)	0	3	M. M. R.: The improvement of Al_2O_3 ceramics properties by the addition of ZrO_2 nanoparticles	34	14 (18)	4 (0)
Nastia Degiuli http://bib.irb.hr/lista-radova?autor=197130	Full professor Technical science / naval architecture	522	A 4 B 1 C 1 D 14	0 (2)	2 (2)	2	2	M. P. B.: The effect of the ship model scale on the propulsion coefficients	0	0	0 (0)
								J. B.: Development of numerical model for green water loading by coupling the mesh based flow models with the meshless models	1	0	
Joško Deur https://bib.irb.hr/lista-radova?autor=174020	Full professor Technical science / mechanical engineering	688	A 12 B 12 C 0 D 31	31 (88)	5 (11)	4	6	B. Š.: Modelling and optimal charging of an electric delivery vehicle fleet	11	2 (11)	2 (0)
Neven Duić https://bib.irb.hr/lista-radova?autor=179672 http://powerlab.fsb.hr/neven/	Full professor Technical science / mechanical engineering	439	A 45 B 14 C 0 D 87	8 (12)	2 (3)	22	1	J. B.: Development of numerical models within the liquid film and Lagrangian spray framework	13	2 (2)	7 (1)
								T. N.: The impact of district heating and cooling on the penetration of intermittent renewable energy sources in moderate and Mediterranean climates	25	21 (21)	

Hrvoje Jasak https://bib.irb.hr/lista-radova?autor=199955	Associate professor Technical science / mechanical engineering	579	A 8 B 0 C 1 D 1 E 0 F 1 G 20	62 (67)	11 (12)	1	0	V. V.: Numerical modelling of coupled potential and viscous flow for marine applications	9	0 (3)	1 (0)
Igor Karšaj http://bib.irb.hr/lista-radova?autor=242295	Associate professor Technical science / mechanical engineering	600	A 3 B 0 C 0 D 14	23 (28)	7 (7)	0	4	L. V.: Numerical modelling of abdominal aortic aneurysm expansion	2	15	0 (0)
Darko Kozarac http://bib.irb.hr/lista-radova?autor=249416	Assistant Professor Technical science / mechanical engineering	704	A 12 B 6 C 2 D 16	22 (42)	3 (5)	0	2	I. T.: The development of a quasi-dimensional dual fuel engine cycle-simulation combustion model	5	0 (5)	1 (0)
Goran Krajačić http://bib.irb.hr/lista-radova?autor=288976	Assistant Professor Technical science / mechanical engineering	214	A 15 B 8 C 0 D 42	243 (266)	11 (12)	4	0	A. F.: Advanced planning of energy self-sufficient wider urban areas using smart energy system approach	3	0 (0)	0 (0)
Darko Landek http://bib.irb.hr/lista-radova?autor=213574	Associate professor Technical science / mechanical engineering	348	A 0 B 10 C 2 D 16	1 (17)	4 (3)	1	6	H. R.: Influence of surface integrity of cold work tool steels on hard coating properties	0	0	0 (1)
Zoran Lulić http://bib.irb.hr/lista-radova?autor=197163	Full professor Technical science / mechanical engineering	570	A 5 B 14 C 0 D 31	14 (16)	2 (2)	0	2	A. V.: Identification and Characterisation of the Operating Parameters of HCCI Engine Fuelled by Biogas	0	0	3 (0)
								M. B.: Influence of the Exhaust Gas Recirculation on the Occurance of Knock in Modern SI Engines	0	0	
Božidar Matijević http://bib.irb.hr/lista-radova?autor=171386	Full professor Technical science / mechanical engineering	286	A 2 B 9 C 0 D 9	3 (10)	0 (1)	1	3	I. K.: New surface diffusion modification process for endoprosthetic bone implants titanium alloy	0	0	0 (1)

Joško Parunov http://bib.irb.hr/lista-radova?autor=206782	Full professor Technical science / naval architecture	645	A 10 B 4 C 1 D 14	27 (54)	5 (9)	1	2	I. G.: Damage propagation in ship structure caused by collision or gounding accident	2	0 (1)	2 (0)
								B. B. P: Structural reliability of damaged oil tanker	7	0 (0)	
Biserka Runje https://bib.irb.hr/lista-radova?autor=137741	Full professor Technical science / mechanical engineering	519	A 10 B 0 C 5 D 15	8 (10)	3 (3)	1	1	A. H.: Achieving traceability of computed tomography in dimensional metrology	3	0 (0)	0 (0)
Vladimir Soldo https://bib.irb.hr/lista-radova?autor=213642	Associate professor Technical science / mechanical engineering	400	A 1 B 0 C 0 D 4	0 (0)	1 (1)	1	1	L. B.: Experimental and theoretical research of geothermal heat pump	3	0 (0)	0 (0)
Ante Šestan https://bib.irb.hr/lista-radova?autor=155886	Full professor Technical science / naval architecture	580	A 4 B 0 C 0 D 8	8 (15)	2 (3)	1	1	I. A.: Energy Efficiency and Environmental Impact of Marine Integrated Power Systems	11	3 (3)	0 (0)
Nedeljko Štefanić https://bib.irb.hr/lista-radova?autor=156176	Full professor Technical science / mechanical engineering	803	A 1 B 3 C 0 D 7	0 (9)	2 (3)	0	6	N. T.: Improvement of production processes by applying pull principles	1	0 (2)	3 (0)
Milan Vujanović https://bib.irb.hr/lista-radova?autor=273685	Assistant Professor Technical science / mechanical engineering	160	A 11 B 02 C 0 D 28	66 (85)	5 (6)	5	1	Z. P.: Numerical modelling of spray and combustion processes using the Euler Eulerian multiphase approach	10	2 (2)	0 (0)

Mentor (name and surname / institution) and link to CROSBI	University position and field / branch of election	Total workload in NH*	A	B	C	D	E	PhD student (initials) and title of the thesis	F	G	Number of PhD students completed PhD study / number of PhD student failed to complet PhD study
Vesna Alar https://bib.irb.hr/lista-radova?autor=187083	Associate professor Technical science / mechanical engineering	265	A 12 B 12 C 0 D 16	10 (12)	5 (5)	1	0				1 (0)
Željko Alar https://bib.irb.hr/lista-radova?autor=210740	Assistant Professor Technical science / mechanical engineering	294	A 6 B 3 C 0 D 7	2 (2)	1 (1)	0	1				0 (0)
Jerolim Andrić http://bib.irb.hr/lista-radova?autor=219630	Associate professor Technical science / naval architecture	482	A 7 B 0 C 0 D 9	5 (8)	3 (5)	0	2				0 (0)
Igor Balen https://bib.irb.hr/lista-radova?autor=190920	Full professor Technical science / mechanical engineering	300	A 0 B 0 C 0 D 5	0 (0)	1 (1)	1	2				1 (0)
Gorana Baršić https://bib.irb.hr/lista-radova?autor=242251	Assistant Professor Technical science / mechanical engineering	301	A 6 B 3 C 1 D 19	9 (11)	2 (2)	1	1				0 (0)
Anita Begić Hadžipašić https://bib.irb.hr/lista-radova?autor=256881	Assistant Professor Technical sciences / metallurgy	322,5	A 3 B 3 C 1 D 7	10 (19)	2 (3)	0	0				0 (0)
Nenad Bojčetić https://bib.irb.hr/lista-radova?autor=186486	Associate professor Technical science / mechanical engineering	585	A 6 B 3 C 4 D 30	5 (6)	1 (1)	0	0				0 (0)

Ivanka Boras https://bib.irb.hr/lista-radova?autor=187061	Full professor Technical science / mechanical engineering	419	A 1 B 2 C 0 D 7	16 (24)	3 (4)	0	0				0 (0)
Željko Božić https://bib.irb.hr/lista-radova?autor=164265	Full professor Scientific field of Aeronautics / rocket and space technology, scientific branch	585	A 2 B 1 C 0 D 6	2 (6)	2 (2)	3	0				0 (0)
Danko Brezak https://bib.irb.hr/lista-radova?autor=235964	Assistant Professor Technical science / mechanical engineering	437	A 5 B 1 C 2 D 13	91 (103)	5 (6)	0	0				0 (0)
Ivan Brnardić http://bib.irb.hr/lista-radova?autor=234421	Assistant Professor Technical sciences / chemical engineering	423,75	A 8 B 3 C 0 D 3	14 (17)	10 (10)	0	0				0 (0)
Franjo Cajner http://bib.irb.hr/lista-radova?autor=76181	Full professor Technical science / mechanical engineering	419	A 2 B 7 C 1 D 15	2 (4)	3 (3)	1	4				3 (0)
Hrvoje Cajner https://bib.irb.hr/lista-radova?autor=275294	Assistant Professor Technical science / mechanical engineering	345	A 1 B 0 C 0 D 6	0 (0)	1 (2)	0	1				0 (0)
Damir Ciglar http://bib.irb.hr/pretrazivanje_rezultat/121120	Full professor Technical science / mechanical engineering	438	A 2 B 0 C 1 D 9	1 (1)	2 (2)	0	0				0 (0)
Mladen Crneković https://bib.irb.hr/lista-radova?autor=128460	Full professor (permanent) Technical science / mechanical engineering	579	A 0 B 0 C 2 D 4	2 (2)	1 (1)	0	3				0 (0)

Mislav Čehil https://bib.irb.hr/lista-radova?autor=275202	Assistant Professor Technical science / mechanical engineering	270	A 1 B 0 C 0 D 2	2 (4)	2 (2)	0	1				0 (0)
Ivan Ćatipović https://bib.irb.hr/lista-radova?autor=275224	Assistant Professor Technical science / naval architecture	627	A 4 B 1 C 0 D 6	3 (5)	1 (3)	0	2				0 (0)
Danko Ćorić http://bib.irb.hr/lista-radova?autor=203786	Associate professor Technical science / mechanical engineering	607	A 5 B 0 C 1 D 7	2 (0)	1	0	3				0 (0)
Predrag Ćosić https://bib.irb.hr/lista-radova?autor=94833	Full professor Technical science / mechanical engineering	406	A 4 B 0 C 0 D 13	12 (12)	3 (3)	0	0				0 (0)
Petar Ćurković http://bib.irb.hr/lista-radova?autor=275182	Assistant Professor Technical science / mechanical engineering	310	A 4 B 4 C 0 D 5	7 (26)	2 (4)	1	2				0 (0)
Slaven Dobrović http://bib.irb.hr/lista-radova?autor=203775	Associate professor Technical science / mechanical engineering	345	A 4 1 C 0 D 3	10 (8)	3 (17)	0	2				0 (0)
Natalija Dolić https://bib.irb.hr/lista-radova?autor=253433	Assistant Professor Technical sciences / metallurgy	367,5	A 11 B 3 C 0 D 23	11 (10)	2 (2)	0	0				0 (0)
Damir Dović http://bib.irb.hr/lista-radova?autor=219652	Associate professor Technical science / mechanical engineering	485	A 2 B 0 C 2 D 9	8 (12)	2 (3)	3	1				0 (0)
Nikša Dubreta https://bib.irb.hr/lista-radova?autor=172332	Associate professor Social sciences / sociology	551,5	A 3 B 3	0 (0)	0 (0)	0	0				0 (0)

Ivo Džijan https://bib.irb.hr/lista-radova?autor=213515	Associate professor Technical science / mechanical engineering	345	A 0 B 1 C 0 D 1	0 (0)	2 (2)	0	1				0 (0)
Goran Đukić https://bib.irb.hr/lista-radova?autor=213526	Associate professor Technical science / mechanical engineering	420	A 4 B 2 C 0 D 11	2 (2)	2 (3)	0	0				1 (0)
Mario Essert http://bib.irb.hr/lista-radova?autor=73841	Full professor (permanent) Computer science / Computing	570	A 2 B 1 C 2 D 2	7 (7)	3 (2)	0	0				1 (0)
Ivica Galić / FSB https://bib.irb.hr/lista-radova?autor=317774	Assistant Professor Technical science / mechanical engineering	255	A 1 B 1 C 0 D 2	1 (1)	1 (1)	0	0				0 (0)
Antun Galović http://bib.irb.hr/lista-radova?autor=73826	Full professor Technical science / mechanical engineering	338	A 3 B 0 C 0 D 1	0 (0)	3 (4)	0	1				3 (0)
Ivica Garašić http://bib.irb.hr/lista-radova?autor=235920	Assistant Professor Technical science / mechanical engineering	338	A 3 B 3 C 0 D 11	12 (18)	1 (2)	0	0				0 (0)
Zoran Glavaš https://bib.irb.hr/lista-radova?autor=262725	Associate professor Technical sciences / metallurgy	340,5	A 5 B 5 C 2 D 19	1 (6)	1 (3)	0	0				0 (0)
Damir Godec https://bib.irb.hr/lista-radova?autor=210751	Associate professor Technical science / mechanical engineering	366	A 1 B 4 C 6 D 6	0 (0)	2 (3)	0	3				0 (0)

Mirko Gojić https://bib.irb.hr/lista-radova?autor=63390	Full professor Technical sciences / metallurgy	400,5	A 12 B 5 C 2 D 20	33 (31)	4 (3)	0	0				0 (0)
Lovorka Grgec Bermanec http://bib.irb.hr/lista-radova?autor=227254	Associate professor Technical science / mechanical engineering	309	A 0 B 2 C 2 D 5	2 (2)	1 (1)	0	0				0 (0)
Krešimir Grilec https://bib.irb.hr/lista-radova?autor=215001	Associate professor Technical science / mechanical engineering	452	A 5 B 3 C 2 D 17	18 (25)	2 (2)	0	0				0 (0)
Marino Grozdek http://bib.irb.hr/lista-radova?autor=242262	Assistant Professor Technical science / mechanical engineering	365	A 1 B 0 C 0 D 0	9 (10)	4 (4)	1	0				0 (0)
Zvonimir Guzović https://bib.irb.hr/lista-radova?autor=113641 SCOPUS; WoS	Full professor Technical science / mechanical engineering	738	A 8 B 1 C 1 D 16	67 (96)	6 (6)	2	2				1 (0)
Neven Hadžić https://bib.irb.hr/lista-radova?autor=320461	Assistant Professor Technical science / naval architecture	120	A 12 B 5 C 7 D 28	25 (26)	3 (3)	0	0				0 (0)
Tatjana Haramina https://bib.irb.hr/lista-radova?autor=297625	Associate professor Technical science / mechanical engineering	380	A 0,11 B 2,58 C 1,00 D 2,83	1 (1)	2 (2)	3	2				0 (0)
Zvonko Herold http://bib.irb.hr/lista-radova?autor=94844	Full professor Technical science / mechanical engineering	495	A 3 B 3 C 0 D 3	5 (10)	2 (4)	0	0				1 (0)

Tamara Holjevac Grgurić http://bib.irb.hr/lista-radova?autor=241081	Assistant Professor Technical sciences / chemical engineering	343,5	A 9 B 3 C 0 D 7	23 (19)	4 (4)	0	0				0 (0)
Damir Hršak http://bib.irb.hr/lista-radova?autor=223691	Full professor Technical sciences / metallurgy	435	A 1 B 1 C 1 D 8	2 (3)	2 (2)	0	0				0 (0)
Suzana Jakovljević https://bib.irb.hr/lista-radova?autor=233284	Assistant Professor Technical science / mechanical engineering	407	A 7 B 2 C 2 D 16	3 (7)	1 (2)	0	1				0 (0)
Tomislav Jarak https://bib.irb.hr/lista-radova?autor=253466	Assistant Professor Technical science / mechanical engineering	415	A 2 B 0 C 0 D 14	1 (1)	5 (5)	0	0				0 (0)
Bojan Jerbić https://bib.irb.hr/lista-radova?autor=121164	Full professor (permanent) Technical science / mechanical engineering	894	A 3 B 9 C 16 D 1	13 (46)	3 (5)	1	7				4 (4)
Andrej Jokić http://bib.irb.hr/lista-radova?autor=253470	Associate professor Technical sciences / fundamental technical sciences	777	A 4 B 0 C 0 D 18	14 (29)	3 (7)	2	1				0 (0)
Marko Jokić bib.irb.hr/lista-radova?autor=263344	Assistant Professor Technical science / mechanical engineering	225	A 3 B 0 C 0 D 4	3 (4)	1 (1)	0	0				0 (0)
Ivan Juraga https://bib.irb.hr/lista-radova?autor=15010	Full professor (permanent) Technical science / mechanical engineering	234	A 1 3 C 0 D 6	0 (1)	1 (2)	1	0				2 (0)

Tanja Jurčević Lulić http://bib.irb.hr/lista-radova?autor=187094	Full professor Technical science / mechanical engineering	555	A 1 B 2 C 0 D 7	1 (9)	1 (2)	0	0				1 (0)
Hrvoje Juretić https://bib.irb.hr/lista-radova?autor=232575	Assistant Professor Technical science / mechanical engineering	301	6	16 (16)	3 (4)	0	2				0 (0)
Josip Kasać http://bib.irb.hr/lista-radova?autor=240664	Associate professor Technical science / mechanical engineering	642	A 9 B 4 C 4 D 23	35 (52)	5 (6)	0	0				1 (0)
Zdenka Keran https://bib.irb.hr/pretrazivanje_rezultat?	Assistant Professor Technical science / mechanical engineering	662	A 2 B 0 C 2 D 6	0 (0)	1 (1)	0	1				0 (0)
Janoš Kodvanj http://bib.irb.hr/lista-radova?autor=152374	Full professor Technical science / mechanical engineering	390	A 8 B 3 C 0 D 17	19 (26)	4 (4)	1	2				2 (0)
Milan Kostelac http://bib.irb.hr/lista-radova?autor=128471	Associate professor Technical science / mechanical engineering	405	A B 8 C 0 D 9	24 (34)	1 (1)	0	0				0 (0)
Hrvoje Kozmar https://bib.irb.hr/lista-radova?autor=210762	Associate professor Technical science / mechanical engineering	566	A 15 B 3 C 0 D 10	73 (83)	7 (8)	4	5				0 (0)
Stjepan Kožuh https://bib.irb.hr/lista-radova?autor=248081	Associate professor Technical sciences / metallurgy	308	A 9 B 5 C 2 D 17	26 (31)	3 (3)	0	0				0 (0)

Zoran Kožuh http://bib.irb.hr/lista-radova?autor=186521	Full professor Technical science / mechanical engineering	314	A 10 B 6 C 1 D 12	1 (3)	1 (1)	0	0				3 (0)
Nenad Kranjčević https://bib.irb.hr/lista-radova?autor=197141	Associate professor Technical science / mechanical engineering	345	A 6 B 6 C 4 D 21	11 (20)	2 (2)	2	2				0 (0)
Severino Krizmanić https://bib.irb.hr/lista-radova?autor=253481	Assistant Professor Technical science / mechanical engineering	305	A 3 B 0 C 0 D 4	2 (2)	2 (2)	1	1				0 (0)
Zoran Kunica https://bib.irb.hr/lista-radova?autor=162390	Full professor Technical science / mechanical engineering	732	A 0 B 0 C 1 D 8	0 (0)	1 (2)	0	0				0 (0)
Ladislav Lazić https://bib.irb.hr/lista-radova?autor=105552	Full professor Technical sciences / metallurgy	389,5	A 1 B 11 C 1 D 20	0 (1)	3 (4)	0	0				0 (0)
Dragutin Lisjak http://bib.irb.hr/lista-radova?autor=186506	Associate professor Technical science / mechanical engineering	780	A 5 B 4 C 0 D 10	3 (3)	1 (3)	0	0				1 (0)
Dražen Lončar https://bib.irb.hr/lista-radova?autor=197152	Associate professor Technical science / mechanical engineering	958	A 8 B 0 C 0 D 1 G 14	32 (37)	4 (6)	1	0				0 (0)
Martina Lovrenić-Jugović http://bib.irb.hr/lista-radova?autor=242304	Assistant Professor Technical science / mechanical engineering	300	A 1 B 4 C 0 D 9	2 (6)	1 (2)	0	0				0 (0)

Davor Ljubas http://bib.irb.hr/lista-radova?autor=213585	Associate professor Technical science / mechanical engineering	340	A 6 B 2 C 0 D 6	88 (89)	4 (4)	0	2				1 (0)
Dubravko Majetić https://bib.irb.hr/lista-radova?autor=162406	Full professor Technical science / mechanical engineering	795	A 2 B 1 C 2 D 13	13 (18)	3 (5)	0	3				1 (0)
Dorian Marjanović http://bib.irb.hr/lista-radova?autor=83344	Full professor (permanent) Technical science / mechanical engineering	360	A 4 B 14 C 0 D	9 (28)	2 (13)	0	0				9 (0)
Damir Markučič http://bib.irb.hr/lista-radova?autor=175043	Full professor Technical science / mechanical engineering	308	A 4 B 1 C 0 D 8	3 (4)	2 (1)	0	0				2 (0)
Dubravko Matijašević https://tkojetko.irb.hr/znanstvenikDetalji.php?sifznan=15463	Assistant Professor Technical science / mechanical engineering	310	A 0 B 1 C 1 D 2	0 (0)	0 (0)	1	2				0 (0)
Vedran Mudronja https://bib.irb.hr/lista-radova?autor=32641	Full professor (permanent) Technical science / mechanical engineering	439	A 4 B 0 C 0 D 12	3 (2)	1 (2)	0	0				6 (0)
Prof. dr. sc. Neven Pavković https://bib.irb.hr/lista-radova?autor=184473	Full professor Technical science / mechanical engineering	400	A 1 B 0 C 0 D 8	5 (3)	2 (2)	3	1				0 (0)
Danijel Pavković https://bib.irb.hr/lista-radova?autor=232586	Assistant Professor Technical science / mechanical engineering	644	A 10 B 1 C 0 D 17	69 (224)	7 (9)	1	1				0 (0)

Joško Petrić http://bib.irb.hr/lista-radova?autor=152396	Full professor (permanent) Technical science / mechanical engineering	953	A 2 B 0 C 1 D 8	18 (33)	5 (6)	0	0				0 (0)
Robert Pezer http://bib.irb.hr/lista-radova?autor=213706	Associate professor Natural sciences / physics	400	A 1 B 0 C 0 D 0	0 (0)	9 (9)	0	0				0 (0)
Ana Pilipović http://bib.irb.hr/lista-radova?autor=305850	Assistant Professor Technical science / mechanical engineering	325	A 4 B 4 C 1 D 17	32 (56)	2 (2)	4	5				0 (0)
Pero Prebeg https://bib.irb.hr/lista-radova?autor=257590	Assistant Professor Technical science / naval architecture	282	A 2 B 0 C 0 D 6	4 (5)	2 (4)	0	2				0 (0)
Vera Rede https://bib.irb.hr/lista-radova?autor=165705	Associate professor Technical science / mechanical engineering	358	A 1 B 2 C 1 D 9	0 (0)	1 (1)	0	2				0 (0)
Stoja Rešković http://bib.irb.hr/lista-radova?autor=57806	Associate professor Technical sciences / metallurgy	240	A 4 B 2 C 0 D 8	0 (2)	1 (1)	0	0				0 (0)
Smiljko Rudan https://bib.irb.hr/lista-radova?autor=216136	Associate professor Technical science / naval architecture	449	A 4 B 3 C 0 D 7	1 (2)	1 (5)	0	2				0 (0)
Zdravko Schauperl https://bib.irb.hr/lista-radova?autor=186464	Full professor Technical science / mechanical engineering	350	A 6 B 0 C 0 D 7	3 (20)	2 (4)	0	1				2 (0)

Daniel Rolph Schneider http://bib.irb.hr/lista-radova?autor=204335	Full professor Technical science / mechanical engineering	461	A 8 B 2 C 1 D 8	20 (26)	5 (5)	2	1				0 (0)
Damir Semenski http://bib.irb.hr/lista-radova?autor=121105	Full professor (permanent) Technical science / mechanical engineering	457	A 4 B 0 C 0 D 6	4 (4)	5 (6)	0	0				1 (0)
Ivo Senjanović https://bib.irb.hr/lista-radova?autor=320461	Academician Technical science / naval architecture	135	A 18 B 2 C 14 D 15	75 (71)	5 (5)	0	0				5 (0)
Sanja Singer http://bib.irb.hr/lista-radova?autor=155344	Full professor Natural sciences / mathematics	540	7	20 (24)	5 (5)	0	0				0 (0)
Ivica Skozrit http://bib.irb.hr/lista-radova?autor=253556	Assistant Professor Technical science / mechanical engineering	420	A 2 B 2 C 2 D 5	2 (6)	3 (2)	0	5				0 (0)
Vedran Slapničar https://bib.irb.hr/lista-radova?autor=203716	Assistant Professor Technical science / naval architecture	422	A 2 B 0 C 0 D 3	1 (0)	1 (2)	0	0				0 (0)
Ljerka Slokar http://bib.irb.hr/lista-radova?autor=262714	Assistant Professor Technical sciences / metallurgy	382	A 2 B 2 C 2 D 12	12 (13)	3 (3)	0	0				0 (0)
Ivica Smojver https://bib.irb.hr/lista-radova?autor=190896	Full professor Scientific field of Aeronautics/ rocket and space technology, scientific branch Design of Aircraft	555	A 4 B 0 C 0 D 9	31 (38)	5 (4)	0	1				1 (0)

Darko Smoljan https://bib.irb.hr/lista-radova?autor=275156	Assistant Professor Technical science / mechanical engineering	315	A 0 B 0 C 0 D 2	0 (0)	0 (0)	0	1				0 (0)
Tahir Sofilić http://bib.irb.hr/lista-radova?autor=057731	Assistant Professor Technical sciences / interdisciplinary engineering	454	A 8 B 2 C 4 D 5	9 (12)	4 (2)	0	0				0 (0)
Jurica Sorić http://bib.irb.hr/lista-radova?autor=51293	Full professor (permanent) Technical science / mechanical engineering	579	A 6 B 4 C 2 D 15	5 (7)	9 (10)	1	6				4 (0)
Josip Stepanić http://bib.irb.hr/lista-radova?autor=213690	Associate professor Technical science / mechanical engineering	478	A 4 B 1 C 2 D 6	4 (1)	2 (2)	1	0				0 (0)
Ivan Stojanović https://bib.irb.hr/lista-radova?autor=275145	Assistant Professor Technical science / mechanical engineering	351	A 11 B 1 C 4 D 16	4 (6)	1 (2)	0	2				0 (0)
Aleksandar Sušić http://bib.irb.hr/lista-radova?autor=227366	Associate professor Technical science / mechanical engineering	300	A 0 B 0 C 0 D 7	0 (0)	0 (0)	0	0				0 (0)
Mario Šavar http://bib.irb.hr/lista-radova?autor=128561	Full professor Technical science / mechanical engineering	554	A 2 B 0 C 0 D 0	1 (74)	2 (2)	0	0				1 (0)
Mladen Šercer https://bib.irb.hr/lista-radova?autor=77160	Full professor (permanent) Technical science / mechanical engineering	588	A 4 B 7 C 9 D 16	4 (10)	4 (4)	4	2				2 (0)

Željko Šitum https://bib.irb.hr/lista-radova?autor=204324	Full professor Technical science / mechanical engineering	616	A B 3 C 1 D 10	8 (9)	5 (5)	0	0				0 (0)
Mario Štorga http://bib.irb.hr/lista-radova?autor=219696	Associate professor Technical science / mechanical engineering	525	A 11 B 1 C 0 D 31	17 (23)	4 (4)	3	2				0 (0)
Anita Štrkalj http://bib.irb.hr/lista-radova?autor=289540	Associate professor Technical sciences / metallurgy	365	A 6 B 8 C 2 D 20	9 (16)	3 (3)	0	0				0 (0)
Srećko Švaić https://bib.irb.hr/lista-radova?autor=48663	Full professor (permanent) Technical science / mechanical engineering	345	A 1 B 0 C 1 D 6	12 (56)	2 (3)	1	0				2 (0)
Zdravko Terze https://bib.irb.hr/lista-radova?autor=187140	Full professor (permanent) Scientific field of Aeronautics/ rocket and space technology, scientific branch	725	A 5 B 1 C 10 D 7	4 (5)	4 (3)	6	7				2 (0)
Zdenko Tonković https://bib.irb.hr/lista-radova?autor=187173	Full professor Technical science / mechanical engineering	285	A 7,31 B 10,86 C 0,75 D 19,73	26 (37)	5 (6)	0	0				5 (0)
Željko Tuković http://bib.irb.hr/lista-radova?autor=213664	Associate professor Technical science / mechanical engineering	558	A 11 B 0 C 0 D 0	78 (89)	6 (7)	2	1				0 (0)

Toma Udiljak http://bib.irb.hr/pretrazivanje_rezultat/90974	Full professor (permanent) Technical science / mechanical engineering	481	A 6 B 0 C 0 D 9	13 (18)	5 (6)	0	0				2 (0)
Zdravko Virag https://bib.irb.hr/lista-radova?autor=73376	Full professor (permanent) Technical science / mechanical engineering	341	A 3 B 4 C 9 D 3	4 (4)	2 (4)	1	2				2 (0)
Nikola Vladimir http://bib.irb.hr/lista-radova?autor=305872	Assistant Professor Technical science / naval architecture	260	A 28 B 1 C 2 D 24	85 (136)	6 (6)	0	0				0 (0)
Milan Vrdoljak http://bib.irb.hr/lista-radova?autor=240675	Associate professor Technical area / aeronautical, rocket and space engineering	471	A 1 B 1 C 2 D 5	0 (0)	0 (0)	0	1				0 (0)
Krešimir Vučković http://bib.irb.hr/lista-radova?autor=236030	Assistant Professor Technical science / mechanical engineering	425	A 2 B 2 C 5 D 2	1 (2)	2 (2)	0	0				0 (0)
Hinko Wolf http://bib.irb.hr/lista-radova?autor=162353	Full professor Technical science / mechanical engineering	665	A 3 B 0 C 0 D 7	6 (6)	3 (4)	0	0				0 (0)
Davor Zorc https://bib.irb.hr/lista-radova?autor=111286	Full professor Technical science / mechanical engineering	435	A 2 B 0 C 1 D 4	6 (11)	1 (4)	0	0				0 (0)
Zdenka Zovko Brodarac https://bib.irb.hr/lista-radova?autor=248092	Associate professor Technical sciences / metallurgy	243,5	A 10 B 10 C 7 D 23	23 (21)	3 (3)	0	0				0 (0)

Davor Zvizdic http://bib.irb.hr/lista-radova?autor=114473	Full professor (permanent) Technical science / mechanical engineering	300	A 10 B 10 C 7 D 23	23 (21)	3 (3)	0	0				5 (0)
Dragan Žeželj http://bib.irb.hr/lista-radova?autor=227381	Assistant Professor Technical science / mechanical engineering	560	A 5 B 1 C 0 D 5	1 (2)	1 (1)	0	0				0 (0)
Irena Žmak http://bib.irb.hr/lista-radova?autor=228900	Assistant Professor Technical science / mechanical engineering	579	A 0 B 1 C 1 D 4	1 (1)	1 (1)	0	0				0 (0)