UNIVERSITY OF SPLIT

FACULTY OF ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE

DETAILED PROPOSAL OF THE STUDY PROGRAMME

GRADUATE UNIVERSITY STUDY IN MECHANICAL ENGINEERING

SPLIT, July 2017.

CONTENTS

GENERAL INFORMATION OF HIGHER EDUCATION INSTITUTION

Name of higher education institution	FACULTY OF ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE
Address	Ulica Ruđera Boškovića 32
Phone	021 305 777
Fax	021 305 776
E.mail	dekanat@fesb.hr
Internet address	htpp://www.fesb.hr

GENERAL INFORMATION OF THE STUDY PROGRAMME

Name of the study programme	MECHANICAL ENGINEERING		
Provider of the study programme	FACULTY OF ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE		
Other participants			
Type of study programme	Vocational study programme ☐	University study programme ☒	
Level of study programme	Undergraduate ☐	Graduate ☒	Integrated ☐
	Postgraduate ☐	Postgraduate specialist ☐	Graduate specialist ☐
Academic/vocational title earned at completion of study	Master of Mechanical Engineering; mag. ing. mech.		

1. INTRODUCTION

1.1. Reasons for starting the study programme

Mechanical Engineering is one of the fundamental areas of engineering sciences, which greatly contributes to creating surplus value and the increase of national income. In present times, mechanical engineering developed into a wide and interdisciplinary area, and there is virtually no human activity in which mechanical engineering does not play an important part, contributing to its development. Mechanical engineering encompasses a wide range of various engineering systems developed in machine engineering and applied in nearly all industrial sectors, including agriculture, construction engineering, chemical and processing industry, as well as medical sciences and a number of other economic activities.

Continuous and rapid developments in the modern world, resulting in new findings and achievements, necessarily require corresponding educational processes. Highly educated professionals are an essential prerequisite for advancement of society and keeping pace with the developed countries. Only through high quality education it is possible to successfully meet the challenges of rapid development and adapt to future technological challenges. Current advancements in mechanical engineering require from the experts to carry out less routine work and be more creative. What is expected of these professionals is to be capable to show competence in following the technological developments during their careers and to lead the technological development in their professional areas, using the intellectual abilities and the scope of their fundamental and professional education.

Such wide scope of necessary knowledge necessitates detailed research in corresponding basic disciplines in the fields of mathematics and natural sciences, branches of physics such as solid mechanics, mechanics of deformable bodies, fluid mechanics and thermodynamics, followed by a series of related disciplines such as electrical engineering and computer science, as well as social sciences (economics, management).

The area of activities of an expert with up-to-date education in the field of mechanical engineering encompasses all the stages of product life-cycle: construction (concept design), production and use, as well as recycling of the outphased product with the use of materials or product renewal and return to service. Environment protection is a special responsibility of a mechanical engineering expert. Reasonable use of physical and energy resources and special consideration for environment protection are necessary to fulfil the requirements of sustainable development.

The goal of the proposed study programme in Mechanical Engineering is to educate professional staff in the area of mechanical engineering to meet the demands of the industry, higher education institutions, governmental and public institutions.

1.2. Relationship with the local community (economy, entrepreneurship, civil society, etc.)

One of the basic tasks of the Faculty is the education of young professionals who will use their knowledge, skills and abilities to become stakeholders in the economic and general development of local and wider community. Having been training leading professionals for more than 55 years, the Faculty successfully accomplished its task, providing necessary staff to participate in the development of economy sectors based on different branches of engineering. The Faculty trained professionals who significantly contributed to economic development in the region, thus supporting the region to initiate and successfully develop high-tech based production activities with its own human resources potential.
Fulfilling the purpose of the study programme in Mechanical Engineering is manifested in the number of students who successfully complete their studies and start their careers in almost all sectors of economy. Following the completion of studies, the acquired knowledge enables the students to find employment in various sectors, e.g. processing, chemical or service industries. This is especially relevant in this moment, with social and economic changes driving the development of new, small and medium technologically advanced enterprises that could serve as the new driving force for economic development.

1.3. Compatibility with requirements of professional organizations

The study programme is compatible with the requirements of the Croatian chamber of mechanical engineers.

1.4. Name possible partners outside the higher education system that expressed interest in the study programme

FESB is a signatory to a number of cooperation agreements with the aim of promoting academic and educational activities, concluded with private enterprises and public organisations, e.g. Ericsson Nikola Tesla, Hrvatska elektroprivreda (national power company), Split-Dalmatia County, Ministry of Defence, Energy institute “Hrvoje Požar”, Croatian academic and research network - CARNet, Brodosplit, Siemens, Microsoft Croatia, HSTec, Solvis, Adria Winch, Odašiljači i veze, Manas, etc. Also, it is important to note that the Croatian Armed Forces expressed a special interest in cooperation, since prospective officers are trained at the Faculty.

1.5. Financing

The study programme is financed by the Ministry of Science, Education and Sports.

1.6. Comparability of the study programme with other accredited programmes in higher education institutions in the Republic of Croatia and EU countries

System of educating experts in the field of mechanical engineering differs a lot in the world and in Europe. During the implementation of teaching activities at the mechanical engineering programme, we continually observe the development of the higher education in the world, and especially in Europe. One of the documents used to draft the curriculum was a monograph produced within the framework of the ERASMUS project titled "Towards the Harmonisation of Electrical and Information Engineering Education in Europe" (http://www.eaeeie.org/theiere/). Although this document represents an overview of study programmes in electrical engineering at 87 European universities, it can be effectively applied to the studies in Mechanical Engineering. When developing the curriculum for the study programme, SEFI recommendations were taken into consideration and special attention was directed at comparability with the curricula of other distinguished European higher education institutions. The study programme in Mechanical Engineering at FESB, in addition to traditional subject area of mechanical engineering, also includes materials science, production engineering and production management. These features are present in a number of other national and European study programmes in mechanical engineering (Zagreb, Rijeka, Slavonski Brod, Maribor, Ljubljana, Munich, Vienna, Budapest,…). In this manner, the mechanical engineering study programme at FESB provides education to experts who will work on development, design, construction, use and maintenance of facilities, machines, tools, devices and other equipment. The experts will also be involved in designing, modelling and simulation of functioning of thermal, power generation and production processes. Other competences include work in the following fields: material sciences, automatization, robotics, process management, quality assurance, measurement; management and advancement of production and production engineering. In the studies, special emphasis is placed on contemporary methods and computer aided technologies.

With regard to curriculum and programme organisation, the graduate university study programme in Mechanical Engineering is highly comparable with related study programmes at renowned national and European universities, such as:

- Fakultet za strojništvo, Univerza v Ljubljani, Slovenia (University of Ljubljana, Faculty of Mechanical Engineering)
  http://www.fs.uni-lj.si/studijska_dejavnost/studijski_programi/
- Technische Univerzität München, Germany (Technical University of Munich)
  http://portal.mytum.de/studium/studiengaenge_en/maschinenwesen_bachelor

1.7. Openness of the study programme to student mobility (horizontal, vertical in the Republic of Croatia, and international)

Graduate university study programme in Mechanical Engineering enables vertical and horizontal mobility of students. In terms of vertical mobility, graduate university study programme in Mechanical Engineering can primarily be followed by the postgraduate study programme in Mechanical Engineering. Vertical mobility is enabled also for other related postgraduate study programmes. In terms of horizontal mobility, the graduate university study in Mechanical Engineering is open for mobility of students of related studies at all Croatian universities, including the Faculty of Mechanical Engineering and Naval Architecture in Zagreb, Faculty of Engineering in Rijeka and Faculty of Mechanical Engineering in Slavonski Brod. Students have the opportunity to complete a part of the study programme at a similar institution in Croatia or abroad. The comparability of the study programme with similar study programmes enables the students to fulfil a part of their course requirements at other higher education institutions in Croatia or abroad.

1.8. Compatibility of the study programme with the University mission and the strategy of the proposer, as well as with the strategy statement of the network of higher education institutions

Graduate university study programme in Mechanical Engineering conforms with the Strategy of the University of Split 2015-2020. In addition to mission and vision of the University of Split, in the process of defining strategic goals, the following strategic documents were taken into account as guidelines:

- EUROPA 2020 strategy for smart, sustainable and inclusive growth,
- Strategic documents of the European Research Area (ERA),
- Strategic documents of the European Higher Education Area (EHEA),
- Strategy of Education, Science and Technology of the Republic of Croatia.

Preparation of the study programme was done in line with the mission, vision and goals which are partly derived from the Scientific Strategy of the University of Split 2009 – 2014, document which promotes creation of internal development plans at the level of University constituents.

Graduate university study programme in Mechanical Engineering conforms with the development guidelines of the Faculty, as well as mission, vision and strategic goals defined in the FESB Development Strategy for the period 2012 – 2016, and is the only programme of this type at the University of Split and the wider region.

The proposed study programme conforms with the strategic document Network of Higher Education Institutions and Study Programmes in the Republic of Croatia, which encourages launching new study programmes in STEM area, as mechanical engineering is one of STEM disciplinary program areas.

1.9. Current experiences in equivalent or similar study programmes

FESB has extensive experience in delivering courses at similar programmes. As a response to growing demand for highly educated professionals in the fields of mechanical engineering and naval architecture, in 1960 the Centre for part-time studies was established in Split, as one of the constituent colleges of the Faculty of Mechanical Engineering and Naval Architecture in Zagreb. The Centre for part-time study in mechanical engineering was closed in 1965 and replaced by the Mechanical

Technology Department, which was founded at the Faculty of Electrical Engineering in Split, providing the two first years of study in Mechanical Engineering. The study programme provided an opportunity for continuing the study programme in Zagreb after the fourth semester. Integration of the studies in electrical engineering, mechanical engineering and naval architecture in 1971 resulted in founding of the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture – FESB, constituent of the University of Split since 1974. The four-year undergraduate study in Mechanical Engineering, with its own curriculum, was finally completed in 1976. The Faculty has implemented professional studies (level VI in former qualifications system) since 1979 until today, with hiatus during the period 1998-2001. In collaboration with the Faculty of Mechanical Engineering and Naval Architecture in Zagreb the Faculty implemented the postgraduate study programme in mechanical engineering during the 1970s, with short interruptions. Permanent postgraduate study programme in Mechanical Engineering at FESB was established in 1998 and has been continually implemented since then. To this date, the academic degree of graduate engineer at the Faculty university undergraduate study in Mechanical Engineering was awarded to 654 students, and the vocational degree of mechanical engineer at the vocational study was awarded to 438 students.

At the end of 2004, the activities within the framework of the Bologna Process and harmonisation of the higher education system in Europe become more intensive. Within the Bologna Process, in 2005 the Faculty introduced new study programmes at undergraduate and graduate levels. New study programmes are developed in accordance with the recommendations of the European accreditation agencies. Undergraduate study programme in Mechanical Engineering was established, as well as graduate study programme in Mechanical Engineering with the following fields of study: Structures and Energy Technology, Computer-Aided Design and Engineering and Production Mechanical Engineering. Professional study programme in Mechanical Engineering was also established as a part of the Bologna Process, and in 2006 the postgraduate university study programme in Mechanical Engineering was established.

To this date, the university degree of Bachelor of Mechanical Engineering was awarded to 194 students, the degree of Master of Mechanical Engineering was awarded to 113 students, the degree of Vocational Associate in Mechanical Engineering was awarded to 47 students, the vocational degree of Bachelor of Mechanical Engineering was awarded to 36 students, the academic title of Master of Science in the academic field of mechanical engineering was awarded to 13 students and the academic title of the Doctor of Science in the scientific field of mechanical engineering and the scientific field of basic engineering sciences was awarded to 35 students.

Quality of education at FESB is confirmed by success and excellence of FESB graduates in the Croatian labour market, but also in the highly developed countries of the world. However, the most important is the fact that professionals trained at FESB represent a foundation of highly educated engineering labour force in the region.

2. DESCRIPTION OF THE STUDY PROGRAMME

2.1. General information

Scientific/artistic area of the study programme	Engineering sciences
Duration of the study programme	2 years
The minimum number of ECTS required for completion of study	120
Enrolment requirements and admission procedure	Completed undergraduate study programme in Mechanical Engineering or completed other related undergraduate study programme with acquired at least 180 ECTS credits, with possible differential exams.

2.2. Learning outcomes of the study programme

The learning outcomes of the study programme are directly related to the learning outcomes of an individual course and represent learning outcomes to be achieved by each student who completes the graduate university study programme in Mechanical Engineering. The learning outcomes are aligned with the Croatian Qualification Framework Act and are listed as common learning outcomes for all three fields of study and additional learning outcomes depending on the selected field of study, in the areas of knowledge, skills and corresponding independence and responsibility.

1. To apply acquired knowledge and skills from the contents of completed coursework in solving specific tasks.
2. To plan working processes.
3. To manage the working process in complex and changeable environment conditions and to make decisions on implementing changes through development and designing complex methods.
4. To select the best mode of communication and presentation technique for completed tasks and the results of engineering work, appropriate to the level and expectations of the audience.
5. To substantiate the completed tasks and knowledge on which they were based, in writing and speaking, in national and international context and in various social and professional groups.
6. To critically review, using special subject terms in Croatian and English.
7. To critically assess and discuss specific engineering issues.
8. To justify ethical standards of the engineering profession.
9. To combine the acquired knowledge and skills in team work.

10. To associate different modelling concepts.
11. To model and simulate technical processes by applying algorithmic procedures.
12. To propose project design, to design and evaluate technical system.
13. To formulate the parameters of a technological process.
14. To combine safety, normative and economic features in all stages of product life-cycle.
15. To conduct complex experiments and measurements, to analyse and interpret collected data and results of measurements and to make conclusions and proposals for solutions.
16. To detect errors and recommend methods for monitoring the quality of a process.

ADDITIONAL LEARNING OUTCOMES FOR THE FIELD OF STUDY STRUCTURES AND ENERGY TECHNOLOGY

1. To propose project design, to design and evaluate technical system.
2. To construct a complex mechanical structure, taking into consideration the defined requirements and load conditions.

ADDITIONAL LEARNING OUTCOMES FOR THE FIELD OF STUDY COMPUTER-AIDED DESIGN AND ENGINEERING

1. To model and simulate technical processes by applying algorithmic procedures.
2. To recommend a software solution for a technical system or process.

ADDITIONAL LEARNING OUTCOMES FOR THE FIELD OF STUDY PRODUCTION MECHANICAL ENGINEERING

1. To detect errors and recommend methods for monitoring the quality of a production process.
2. To evaluate the features of contemporary production strategies.

2.3. Employment possibilities

Split is the economic and university hub of the entire Dalmatian region, as well as one part of the neighbouring region of Bosnia and Herzegovina. FESB is the only higher education institution in the region of south Croatia which delivers the university study programmes in Mechanical Engineering. To respond to the demands of the development in the region, already in 1965 first two years of the study programme in Mechanical Engineering were established, with the purpose of educating professionals that would participate in the development of economy sectors based on mechanical engineering. Fulfilling the purpose of the study programme in Mechanical Engineering is manifested in the number of students who successfully complete their studies and start their careers in almost all sectors of economy. Following the completions of studies, the acquired knowledge enables the students to find employment in various sectors, e.g. processing, chemical or service industries. This is especially relevant in this moment, with social and economic changes driving the development of new, small and medium technologically advanced enterprises that could serve as the new driving force for economic development. Following the completion of studies, the students acquire an appropriate level of knowledge and skills that enable them to perform professional tasks and provide them with skills necessary for participating in working processes in the field of mechanical engineering.

The special importance of this study programme, with regard to the labour market, is that it represents the second stage of the comprehensive two-cycle educational process which results in producing a fully educated expert capable of solving the most complex engineering tasks and participating in scientific research. The demand for experts with these learning outcomes considerably exceeds the available number of educated experts in the region, Croatia and the world.

2.4. Possibilities of continuing studies at a higher level

After completing the graduate university study programme, graduates may continue their studies at the postgraduate study programme in Mechanical Engineering or any other related study programme in accordance with the admission requirements of the postgraduate study programme.

2.5. Name lover level studies of the proposer or other institutions that qualify for admission to the proposed study

Undergraduate study programme in Mechanical Engineering.

2.6. Structure of the study

The study programme is structured per semesters, lasting 4 semesters, two in each academic year. Each semester corresponds to 30 ECTS credits. The study programme offers three fields of study:

- Structures and Energy Technology;
- Computer-Aided Design and Engineering;
- Production Mechanical Engineering.

During studies, in addition to mandatory courses, the students select seven elective courses. The final component of the study programme is preparing and defending the diploma thesis. The conditions for enrolling a course are listed in the course table. Lectures are delivered in groups up to 100 students, auditory exercises and seminars in groups of 30 students, laboratory exercises in groups of 10 students and design exercises in groups of 6 students.

2.7. Guiding and tutoring through the study system

During the course of study programme activities, students have access to all the Faculty services. For the purpose of timely and effective communication, notifications and information are provided to students through the e-learning portal.

2.8. List of courses that the student can take in other study programmes

Students may enrol courses from other study programmes only as elective courses which are not included in the standard workload of 30 ECTS credits per semester.

2.9. List of courses offered in a foreign language as well

Course tables for individual courses list the option of teaching a course in a foreign language.

2.10. Criteria and conditions for transferring the ECTS credits

Transfer or recognition of ECTS credits between related graduate university study programmes is allowed. The criteria and conditions for transferring the ECTS credits are regulated by the *Regulations on Studies and Study System at the University of Split*.

2.11. Completion of study

Final requirement for completion of study	Final thesis ☐ Diploma thesis ☒	Final exam ☐ Diploma exam ☐
Requirements for final/diploma thesis or final/diploma/exam	The requirement for applying for the diploma thesis is acquired 60 ECTS credits.	
Procedure of evaluation of final/diploma exam and evaluation and defence of final/diploma thesis	The final paper is evaluated by the Committee for diploma thesis and the defence is public and held in the presence of the Committee for defence of diploma thesis.	

2.12. List of mandatory and elective courses

Module: Structures and Energy Technology - 261

List of courses

Year of study: 1.

Semester: I.

STATUS	CODE	COURSE	HOURS IN SEMESTER L	S	AE	LE	DE	ECTS
Mandatory	FEML01	Mathematics – special topics	30	0	30	0	0	5
	FESL01	Fluid flow	30	0	15	15	0	5
	FESL10	Finite element method	30	0	15	0	15	5
	FESL12	Heat and mass transfer	30	0	30	0	0	5
	FETL18	Machine tools	45	0	0	15	0	5
	FESL23	Heating and air conditioning	30	0	30	0	0	5
	Total		195	0	120	30	15	30
	There are no elective courses.							

List of courses

Year of study: 1.

Semester: II.

STATUS	CODE	COURSE	HOURS IN SEMESTER L	S	AE	LE	DE	ECTS
Mandatory	FESL04	Fatigue strength of materials	30	0	0	30	0	5
	FESL05	Optimization methods	45	0	0	15	0	5
	FETL25	Manufacturing process planning	45	0	0	0	15	5
	Total		120	0	0	45	15	15
Elective		Elective Course 1.*						
		Elective Course 2.*						
		Elective Course 3.*						
	*	**Elective courses are chosen using the List of the elective courses 1 . Three elective courses are chosen.**						

List of courses								
Year of study: 2.								
Semester: III.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FESL06	Transport in industry	30	0	0	0	30	5
	FETL01	Materijali 3	45	0	0	15	0	5
	FETL04	Engineering maintenance	45	0	0	15	0	5
	Total		120	0	0	30	30	15
Elective		Elective Course 4.*						
		Elective Course 5.*						
		Elective Course 6.*						
	*	**Two elective courses are chosen using the List of the elective courses 1 . Third one is chosen from the List of the elective courses 2 or 3. Three elective courses are chosen.**						

List of courses								
Year of study: 2.								
Semester: IV.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FEXX02	Diploma thesis						30
	Total							
	There are no elective courses.							

Module: Computer-Aided Design and Engineering - 262

List of courses									
Year of study: 1.									
Semester: I.									
STATUS	CODE	COURSE	HOURS IN SEMESTER						ECTS
			L	S	AE	LE	DE		
Mandatory	FEML01	Mathematics – special topics	30	0	30	0	0		5
	FESL01	Fluid flow	30	0	15	15	0		5
	FESL10	Finite element method	30	0	15	0	15		5
	FESL12	Heat and mass transfer	30	0	30	0	0		5
	FETL05	Plant layout	30	0	0	15	15		5
	FESL17	Computer aided design 1	30	0	0	0	30		5
	Total		180	0	90	30	60		30
	There are no elective courses.								

List of courses								
Year of study: 1.								
Semester: II.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FESM15	Computer aided design 2	30	0	0	0	30	5
	FESL05	Optimization methods	45	0	0	15	0	5
	FETL07	Computer aided manufacturing	30	0	0	0	30	5
	Total		105	0	0	15	60	15
Elective		Elective Course 1.*						
		Elective Course 2.*						
		Elective Course 3.*						
	*	**Elective courses are chosen using the List of the elective courses 2 . Three elective courses are chosen.**						

List of courses									
Year of study: 2.									
Semester: III.									
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FETL06	Production planning and control	30	0	15	15	0	5
	FETL04	Engineering maintenance	45	0	0	15	0	5
	FESL09	Engineering design	30	0	0	0	30	5
	Total		105	0	15	30	30	15
Elective		Elective Course 4.*						
		Elective Course 5.*						
		Elective Course 6.*						
	*	**Two elective courses are chosen using the List of the elective courses 2 . Third one is chosen from the List of the elective courses 1 or 3. Three elective courses are chosen.**						

List of courses								
Year of study: 2.								
Semester: IV.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FEXX02	Diploma thesis						30
	Total							
	There are no elective courses.							

Module: Production Mechanical Engineering - 263

List of courses								
Year of study: 1.								
Semester: I.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FEML02	Statistics	30	0	30	0	0	5
	FETL01	Materijali 3	45	0	0	15	0	5
	FETL18	Machine tools	45	0	0	15	0	5
	FETL04	Engineering maintenance	45	0	0	15	0	5
	FESL12	Heat and mass transfer	30	0	30	0	0	5
	FETL22	Nonconventional machining processes	45	0	0	15	0	5
	Total		240	0	75	45	0	30
	There are no elective courses.							

List of courses								
Year of study: 1.								
Semester: II.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FETL25	Manufacturing process planning	45	0	0	0	15	5
	FETL08	Economic treatment of materials	30	0	0	0	30	5
	FESL05	Optimization methods	45	0	0	15	0	5
	Total		120	0	0	15	45	15
Elective		Elective Course 1.*						
		Elective Course 2.*						
		Elective Course 3.*						
	*	**Elective courses are chosen using the List of the elective courses 3 . Three elective courses are chosen.**						

List of courses									
Year of study: 2.									
Semester: III.									
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FETL06	Production Planning And Control	30	0	15	15	0	5
	FESL01	Fluid flow	30	0	15	15	0	5
	FESL10	Finite element method	30	0	15	0	15	5
	Total		90	0	45	30	15	15
Elective		Elective Course 4.*						
		Elective Course 5.*						
		Elective Course 6.*						
	*	**Two elective courses are chosen using the List of the elective courses 3 . Third one is chosen from the List of the elective courses 1 or 2. Three elective courses are chosen.**						

List of courses								
Year of study: 2.								
Semester: IV.								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Mandatory	FEXX02	Diploma thesis						30
	Total							
	There are no elective courses.							

List of elective courses 1								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Elective	FEML02	Statistics	30	0	30	0	0	5
	FESL43	Theory of mechanisms	30	0	30	0	0	5
	FESL17	Computer aided design 1	30	0	0	0	30	5
	FESL09	Engineering design	30	0	0	0	30	5
	FESL15	Mechanics of materials 3	30	0	30	0	0	5
	FESL16	Product Development and Management	30	0	0	0	30	5
	FESL18	Introduction to fracture mechanics	30	0	30	0	0	5
	FESL20	Mechanical drives	30	0	30	0	0	5
	FESL22	Renewable energy sources and sustainable development	30	0	30	0	0	5
	FESL37	Refrigeration	30	0	30	0	0	5
	FESL25	Thermal devices	30	0	30	0	0	5
	FESL27	Thermal power plants	30	0	30	0	0	5
	FESL29	Fuel cells	30	0	30	0	0	5
	FESL30	Ship propulsion system	45	0	15	0	0	5
	FESL38	Aerotechnics and wind turbines	30	0	30	0	0	5
	FESL39	Hybrid energy systems	30	0	30	0	0	5
	FENI09	Power system operation and control	30	0	15	15	0	5
	FESL24	Energy efficiency in buildings	30	0	30	0	0	5
	FESL40	Technical innovations	30	0	30	0	0	5
	FEOL02	English language for academic purposes	0	45	0	0	0	5
	FETM08	Sustainable production	30	0	15	15	0	5
	FESL42	Theory of plasticity and viscoelasticity	45	0	15	0	0	5
	FESL41	Engines and vehicles	30	0	15	15	0	5
	FETL07	Computer aided manufacturing	30	0	0	0	30	5
	FESL11	Metal structures design	30	0	0	0	30	5
	FESL49	Numerical synthesis in engineering	45	0	0	15	0	5
	FESL47	Design & projecting of aluminium structures	30	0	0	4	26	5
	FESL48	Vehicle dynamics	30	0	15	15	0	5
	FEXX06	Professional training						5

List of elective courses 2								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Elective	FELA28	Computer networks	45	0	0	15	0	5
	FESL33	Evaluation of industrial projects	30	0	30	0	0	5
	FESL13	Vibration	30	0	0	30	0	5
	FESE06	Introduction to information systems	30	0	0	15	0	5
	FELL01	Databases	30	0	0	30	0	5
	FESL04	Fatique strength of materials	30	0	0	30	0	5
	FESL44	Termodinamička analiza procesa	30	0	30	0	0	5
	FESL37	Refrigeration	30	0	30	0	0	5
	FESL25	Thermal devices	30	0	30	0	0	5
	FESL24	Energy efficiency in buildings	30	0	30	0	0	5
	FESL23	Heating and air conditioning	30	0	30	0	0	5
	FESL46	Cogeneration power plant optimization	30	0	30	0	0	5
	FEOL02	English language for academic purposes	0	45	0	0	0	5
	FETM08	Sustainable production	30	0	15	15	0	5
	FESL42	Theory of plasticity and viscoelasticity	45	0	15	0	0	5
	FESL41	Engines and vehicles	30	0	15	15	0	5
	FESL20	Mechanical drives	30	0	30	0	0	5
	FESL49	Numerical synthesis in engineering	45	0	0	15	0	5
	FESL47	Design & projecting of aluminium structures	30	0	0	4	26	5
	FESL27	Thermal power plants	30	0	30	0	0	5
	FEXX06	Professional training						5

List of elective courses 3								
STATUS	CODE	COURSE	HOURS IN SEMESTER					ECTS
			L	S	AE	LE	DE	
Elective	FELL02	Industrial electronics	30	0	0	30	0	5
	FELL03	Robotics	30	0	30	0	0	5
	FETL23	Production management	45	0	30	0	0	5
	FETL10	Heat treatment and surface protection	30	10	0	20	0	5
	FETL11	Zavarljivost materijala	30	0	0	30	0	5
	FESL21	Measurement and experimental analysis of vibration	30	0	30	0	0	5
	FETL15	Technical logistics	30	0	0	15	15	5
	FETL07	Computer aided manufacturing	30	0	0	0	30	5
	FETL16	Quality assurance	30	0	15	15	0	5
	FETL17	Hydraulic and pneumatic systems	30	0	0	15	15	5
	FETL27	Modeling and optimization of technological processes	30	15	15	0	0	5
	FETL05	Plant layout	30	0	0	15	15	5
	FETL19	Technical diagnostics	30	0	0	30	0	5
	FETL20	Tools and fixtures	30	0	0	0	30	5
	FESL40	Technical innovations	30	0	30	0	0	5
	FEOL02	English language for academic purposes	0	45	0	0	0	5
	FETM08	Sustainable production	30	0	15	15	0	5
	FESL42	Theory of plasticity and viscoelasticity	45	0	15	0	0	5
	FESL41	Engines and vehicles	30	0	15	15	0	5
	FETL26	Design for assembly	30	0	0	0	30	5
	FENL01	Electrical drives	30	0	15	15	0	5
	FESL27	Thermal power plants	30	0	30	0	0	5
	FEXX06	Professional training						5

2.13. Course description

NAME OF THE COURSE	**AEROTECHNICS AND WIND TURBINES**							
Code	FESL38	Year of study	1.					
Course teacher	Branko Klarin, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Goran Gašparović, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective	Percentage of application of e-learning	0					
COURSE DESCRIPTION								
Course objectives	Training students for: - explain and apply the basic properties of atmospheric currents, - recognize the effects of air currents in the facilities, especially wind turbines and choose the correct relations to solve them, - analyze and calculate air energy conversion and simple problems.							
Course enrolment requirements and entry competences required for the course								
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - explain the genesis of the wind in the atmosphere and describe the main impacts on the atmospheric flow, - enumerate and describe the basic devices for monitoring the state of the atmosphere, - analyze the state of wind and specify its main features, - list the parts smaller and larger wind turbines and calculate the basic operating parameters, - to comment on the status and trends of offshore wind farms, - identify and describe the basic features of a rigid sail, - present and comment on the use of priletnika and drones.							

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction to aerotechnics. Terms and conditions. Relative flow.	2	2
	The atmospheric flows and wind genesys. Climate change and the impact of the global flow.	2	2
	Atmospheric boundary layer and influences on airflow. The impacts on the air flow. Environmental flow and the complex topography.	2	2
	Condition monitoring, meteorological devices and measurements. Wind potential.	2	2
	Opposing facilities. Boundary layer around nastrujavanih surface. Lifting surfaces and controls.	2	2
	The effect of air flow and gas at various facilities, transport facilities and Turbomachinery (wind turbines).	2	2
	Atmospheric singularities. The extreme effects to the objects and humans. Ways to protect people and the environment.	2	2
	Wind turbines and small wind turbines. Urban wind powering.	2	2
	Off-shore wind farms.	2	2

	The rigid sails and semi-rigid sails. Wind assisted ships.	2	2
	Flow around cylinder and the turbulent wake.	2	2
	Introduction to fly. Ground effect. Drones and unmanned aerial vehicles.	2	2
	Selected topics of aerospace and wind tunnels.	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	3,5	Research		Practical training	
	Experimental work		Report		Individual work	
	Essay		Seminar essay	1,5	Laboratory exercises	
	Tests		Oral exam		Preparation for laboratory exercises	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of seminar essay progress. In the final exams students that did not pass the midterm exams take part. The final exams are carried out as finished seminar essay acceptance. The requirement for passing grade is the positive grade of seminar essay. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) where in percentage: • M1, M2 – seminar essay status.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	B. Klarin: Aerotehnika i vjetroturbine, autorizirana predavanja, FESB		e-learning portal
	- Kuette, A.M. and Chou C.-Y.: Foundations of Aerodynamics: bases of Aerodynamic Design, Wiley, 1997.		book
	- Dyrbye, C.; Hansen, S.O.: Wind Loads on Structures, Wiley, 1996.		book

Optional literature (at the time of submission of study programme proposal)	- McCormick, B.W.: Aerodynamics, Aeronautics, and Flight Mechanics, Wiley, 1995.
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	- Feedback from graduate students about the course relevance

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">COGENERATION POWER PLANT OPTIMIZATION</td></tr>
<tr><td>Code</td><td>FESL46</td><td>Year of study</td><td colspan="6">2.</td></tr>
<tr><td>Course teacher</td><td>Gojmir Radica, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="6">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Dario Bezmalinović, Ph. D., Teaching assistant
Ivan Tolj, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td colspan="2">DE</td></tr>
<tr><td>30</td><td>0</td><td>30</td><td>0</td><td colspan="2">0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="6">0</td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:
- understanding of complex concept and principles of cogeneration systems,
- development of cogeneration systems for power plant,
- modelling and optimization of cogeneration power plant..</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">Thermodynamics, Fluid Mechanics</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:
- identify different cogeneration systems and components,
- calculate operating parameters of cogeneration systems,,
- analyze the energy transformation in thermal machines and its dependence on characteristics of the process,
- select components of cogeneration system based on different application,
- modelling and optimization of cogeneration plants.
- evaluate proper use of cogeneration plant, load, efficiency and environmental consideration.</td></tr>
<tr><td rowspan="12">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="6">Overview of cogeneration systems.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Main components of the cogeneration plant</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Auxiliary components and systems</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Diagrams flows of material, energy and losses</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Marine cogeneration system.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Stationary cogeneration plants.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Microcogeneration systems.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Water supply and cooling systems. Transport and handling of fuel.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">The economic aspect of cogeneration systems.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Modelling cogeneration systems.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">Optimisation of cogeneraton systems.</td><td>2</td><td>2</td></tr>
</table>

	New technologies implemented in cogeneration systems..	2	2
	Experts systems for monitoring, diagnostic and optimisation.	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,5	Research		Practical training	
	Experimental work		Report		Individual work	2,7
	Essay		Seminar essay		(Other)	
	Tests	0,2	Oral exam		(Other)	
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests (oral test-if necessary). The requirement for passing grade is the positive assessment of exercises and 50 % points for theory and exam on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,54 (M1 + M2) the activities in percentage: • M1, M2 – test results.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Radica G.: Predavanja iz predmeta Optimiranje kogeneracijskih postrojenja		e-learning portal
	Prelec Z., ENERGETIKA U PROCESNOJ INDUSTRIJI, Školska knjiga Zagreb, Zagreb 1994.	5	
	Vučina, D.: "Metode numeričkog optimiranja", Sveučilišni udžbenik , Split,	5	
	Belegundu, A.D.; Chandrupatla, T.R.: "Optimization Concepts and Applications in Engineering", Prentice Hall, 1999.		

Optional literature (at the time of submission of study programme proposal)	1. Harrington R.L.: "Marine Engineering", SNAME, N.J. USA, 1992. 2. Arora, J.S.: "Introduction to Optimum Design", McGraw Hill, 1989. 3. Rao, S.S.: Engineering Optimization, Wiley Interscience, 1996.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">COMPUTER AIDED DESIGN 1</td></tr>
<tr><td>Code</td><td>FESL17</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Gojko Magazinović, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Ivan Pivac, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td><td>30</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5">50</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- understanding and application of basic terms and principles of feature-based modeling, parametric modeling, and geometric modeling,
- ability to build simple models, assemblies, and technical drawings by using a geometric modeling tool.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">-</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- explain fundamental principles of geometric modeling, parametric modeling, and feature based modeling,
- describe an importance and available approaches to the exchange of design data between the different CAD systems,
- explain the fundamental principles of the parametric curve and parametric surface definitions,
- use a computer aided design tool,
- construct simple geometric models and assemblies,
- determine the model cross-section properties,
- determine the model mass properties.</td></tr>
</table>

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction to a course. Description of an e-learning portal.	2	
	Introduction to CAD/CAM/CAE systems, part I: basic terms.	2	
	Introduction to CAD/CAM/CAE systems, part II: applications; the expansion of 3D CAD technology.	2	
	Elements of CAD/CAM/CAE systems; hardware; software.	2	
	Geometric modeling; feature based modeling; parametric modeling.	2	
	Introduction to graphics programming, part I: OpenGL; coordinate systems; homogeneous coordinates; coordinate transformations.	2	
	Introduction to graphics programming, part II: hidden line removal; rendering; shading; ray-tracing.	2	
	First midterm exam		
	CAD data structures; exchange of design data between the different CAD systems.	2	
	Parametric curves, part I: Hermite curve.	2	
	Parametric curves, part II: Bezier curve; B-Spline curve.	2	
	Parametric curves, part III: interpolation curve; geometric continuity; NURBS curves.	2	
	Parametric surfaces: bilinear surface; Bezier surface; B-Spline	2	

	surface; NURBS surface.		
	Modeling and analysis (A brief on structural analysis).	2	
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours
	The environment of CAD design tool; extrusion of a closed curve.		2
	Sketch tool; extrude; round; chamfer; hole; parameters.		2
	Simple model editing.		2
	Revolving of a closed curve.		2
	Design planes.		2
	Sections; shells, constraints; sketching utilities.		2
	Translation patterns; one- and two-dimensional.		2
	Radial patterns of set features.		2
	Radial patterns of built features; feature copying.		2
	Helical sweep.		2
	Making assemblies.		2
	Technical drawing preparation, part I.		2
	Technical drawing preparation, part II.		2

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☒ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☒ computer work (other)
Student responsibilities	Attendance of at least 70% lectures and all design exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	0,8
	Essay		Seminar essay		Computer work	2
	Tests	0,2	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterm exams during the semester (carried out by using computer and e-learning portal; 90 minutes duration; each exam: 25 theoretical questions and two design problems). The final exams attend students that didn't pass the midterm exams. The requirements for passing grade are the fulfillment of student responsibilities and at least 50% points on each midterm exam or the final exam. Grade (in percentage) is determined as follows: Grade(%) = (M1 + M2)/2 where M1 and M2 are the midterm grades. The final grades are: satisfactory (2), grades from 50% to 61%; good (3), grades from 62% to 74%; very good (4), grades from 75% to 87%; and excellent (5), grades from 88% to 100%.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	G. Magazinović, Bilješke uz predavanja, FESB	-	e-learning portal
	R. Toogood: Creo Parametric 2.0 Tutorial and Multimedia DVD, SDC Publications, Mission, 2013.	1	https://books.google.hr
Optional literature	- K. Lee: Principles of CAD/CAM/CAE Systems, Addison-Wesley, Reading, 1999.		

(at the time of submission of study programme proposal)	- C. McMahon, J. Browne: CADCAM: Principles, Practice and Manufacturing Management, Prentice-Hall, Harlow, 1998.
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results by the above learning outcomes - Feedback from students via surveys - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**COMPUTER AIDED DESIGN 2**							
Code	FESM15	Year of study	1					
Course teacher	Gojko Magazinović, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Ivan Pivac, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	0	0	30	
Status of the course	Obligatory	Percentage of application of e-learning	50					

COURSE DESCRIPTION

Course objectives	Training students for: - understanding the role and significance of CAD/CAE software in contemporary design and manufacturing systems, - performing engineering calculations using a spreadsheet software, - building geometric models, generating its technical drawings, and performing its static structural analyses using a contemporary CAD system.
Course enrolment requirements and entry competences required for the course	Completion of Computer Aided Design 1 course
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - solve simple engineering calculation problems by using a spreadsheet tool, - draw a graph by using a spreadsheet tool, - use a computer aided design and analysis tool, - generate geometric models and assemblies of moderate complexity, - link geometric models with spreadsheet analyses, - determine the peak stress and deformation within the simple geometric models.

Course content broken down in detail by weekly class schedule (syllabus)

Course content	L or S hours	AE hours
Introduction to a course. Description of an e-learning portal.	2	
History of computing and computers; computer representation of numbers; engineering calculations; sample workbooks.	2	
Graphical representation of engineering results.	2	
Spreadsheet numerical integration.	2	
Spreadsheet equation solver; systems of equations.	2	
The environment of CAD software; references; design intent.	2	
Curve and surface modeling.	2	
First midterm exam		
Feature parent-child relationship; model editing.	2	
Model and section properties; measurements; material definition.	2	
Degrees of freedom and assemblies; geometric tolerances; surface finishes.	2	
Analysis as a feature; linking models and analysis.	2	
Examples of models, analysis, and optimization.	2	
Structural analysis: h-methods; p-methods; boundary conditions; result analysis.	2	
Second midterm exam		

List of laboratory or design exercises	LE or DE hours
Spreadsheet tool elements; making a simple worksheet; built-in	2

	functions.	
	Absolute and relative cell addressing; complex expressions.	2
	Working with data series; conditional formatting; graphing.	2
	Numerical integration: trapezoidal and Simpson's rule.	2
	Equations; linear systems; nonlinear systems.	2
	Basic modeling; parameters; relations; Project, part I: simple parts.	2
	Curves and surfaces.	2
	Project, part II: advanced parts.	2
	Project, part III: assembly.	2
	Project, part IV: technical drawing.	2
	Analysis feature.	2
	Modeling, analysis, and optimization.	2
	Static structural analysis of simple parts.	2

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☒ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☒ computer work
Student responsibilities	Attendance of at least 70% lectures and all design exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	0,8
	Essay		Seminar essay		Computer work	2
	Tests	0,2	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterm exams during the semester (carried out by using computer and e-learning portal; 90 minutes duration; first exam: five theoretical questions, two numerical and one design problems; second exam: five theoretical questions and three design problems). The final exams attend students that didn't pass the midterm exams. The requirements for passing grade are the fulfillment of student responsibilities and at least 50% points on each midterm exam or the final exam. Grade (in percentage) is determined as follows: Grade(%) = (M1 + M2)/2 where M1 and M2 are the midterm grades. The final grades are: satisfactory (2), grades from 50% to 61%; good (3), grades from 62% to 74%; very good (4), grades from 75% to 87%; and excellent (5), grades from 88% to 100%.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	G. Magazinović, Bilješke uz predavanja, FESB	-	e-learning portal
	R. Toogood: Creo Parametric 2.0 Tutorial and Multimedia DVD, SDC Publications, Mission, 2013.	1	https://books.google.hr
	B. Plazibat, i drugi: Informatika 1, Sveučilišni studijski centar za stručne studije, Split, 2010.	-	Link at e-learning portal

Optional literature (at the time of	- K. Lee: Principles of CAD/CAM/CAE Systems, Addison-Wesley, Reading, 1999. - C. McMahon, J. Browne: CADCAM: Principles, Practice and Manufacturing

submission of study programme proposal)	Management, Prentice-Hall, Harlow, 1998.
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results by the above learning outcomes - Feedback from students via surveys - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="6">COMPUTER AIDED MANUFACTURING</td></tr>
<tr><td>Code</td><td>FETL07</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td>Course teacher</td><td>Dražen Bajić, Ph. D, Full Professor
Sonja Jozić, PhD, Assistant Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Mario Veić, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td><td>30</td></tr>
<tr><td>Status of the course</td><td>Obligatory/Elective</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- exploring the possibilities of computer application in production with an emphasis on programming CNC machine tools and additive technology.
- mastering of manual programming and programming in CAD / CAM systems in machining of simple and complex workpiece.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- analyze interactions and need for a comprehensive approach to part design and their manufacturing
- apply acquired knowledge and skills to solve a specific task.
- apply acquired knowledge and skills in teamwork.
- consider role of CAD / CAM systems in modern design and manufacture
- generate program for the automatic parts production on CNC machine tools
- compare and highlight differences between manual programming and programming by CAD / CAM systems
- identify motives of applying computer controlled machine tools and systems for rapid prototyping
- comment advantages and disadvantages in development and manufacture of prototypes using CNC machining and additive technology.</td></tr>
<tr><td rowspan="8">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction. Basic terms. Historical development of CAM.</td><td>2</td><td>/</td></tr>
<tr><td colspan="5">Geometric modeling. Engineering modeling. Types of geometric models. 2D and 3D geometric models.</td><td>2</td><td>/</td></tr>
<tr><td colspan="5">Geometric modeling. Modeling by means of features. Parametric modeling. Disadvantages of geometric models.</td><td>2</td><td>/</td></tr>
<tr><td colspan="5">CNC machine tools programming. NC and CNC programming. Analysis of technical drawings. Technological documentation. Programming methods. Manual programming. Automatic programming.</td><td>2</td><td>/</td></tr>
<tr><td colspan="5">CNC machine tools programming. Coordinate system. Measurement system. Reference points. Defining cutting tools. The structure of the program block.</td><td>2</td><td>/</td></tr>
<tr><td colspan="5">CNC turning. The procedure and machine tools. Tools for turning. Selection of cutting parameters. Manually programming CNC turning.</td><td>2</td><td>/</td></tr>
<tr><td colspan="5">Automatic programming of CNC lathes. Possibilities of software package CATIA. Associative database. Defining of</td><td>2</td><td>/</td></tr>
</table>

	machining. Machining simulation and CNC code generating.		
	First midterm exam		
	CNC milling. Different machining operations and machine tools. Tools clamping. Tools storage. Manipulation with tool and workpiece.	2	/
	CNC milling. End milling. Face milling. Profile milling.	2	/
	CNC milling. Manually programming. Automatic programming in CATIA.	2	/
	Mill turning. Coaxial and orthogonal mill turning.	2	/
	Rapid prototyping. Stereolithography process. Laminating. Selective sintering.	2	/
	Rapid prototyping. Sintering by precipitation. 3D printing. Hybrid procedure 3DP / SLA.	2	/
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours
	Construction of simple geometric shapes and their extrusion.		2
	Construction of complex geometric shapes and their extrusion.		4
	Technical documentation - Drafting module.		2
	CNC manual programming for lathes.		4
	Module for machining - turning. Roughing and finishing, holes and threads		2
	Module for machining - milling. Roughing.		2
	Generating NC code for machining center.Communication between computers and machining center. Machining on CNC vertical machining center Spinner VC560.		2
	Module for machining - milling. Roughing and finishing, holes.		2
	Module for machining - milling. Surface machining, profile milling.		2
	Generating NC code for machining center.Communication between computers and machining center. Machining on CNC vertical machining center Spinner VC560.		2
	Rapid prototyping. STL files. 3D printing		2

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Manual programming of turning operation	0,5
	Essay		Seminar essay		Individual work	2,25
	Tests	0,25	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. In the makeup exam students take the entire exam. The midterm, final and makeup exams are carried out as written tests. The requirements for passing grade is:

	1. Positively evaluated program task "Manually programming CNC turning" 2. 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,2 L + 0,4 (M 1 + M 2) L – grade of program task "Manually programming CNC turning" M1, M2 – test results of first and second midterm exam. Final grade is determined according to: Percentage Grade 50% do 61% sufficient (2) 62% do 74% good (3) 75% do 87% very good (4) 88% do 100% excellent (5) Examination terms: according to the timetable.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Xun Xu: „Integrating Advanced Computer-Aided Design, Manufacturing, and Numerical Control: Principles and Implementations“, University of Auckland, New Zealand, 2009.		
	Hoffmann M.: „CAD/CAM mit CATIA V5“, Hanser Verlag, Muenchen, 2005.		
	Bajić, D., Jozić, S., "Computer aided manufacturing“, lecturing, eLearning, 2015.		eLearning portal
Optional literature (at the time of submission of study programme proposal)	Balič, J.: CAD/CAM postopki, Univerza v Mariboru, Maribor, 2002. McMahon, C., Brown, J.: CAD CAM principles, practice and manufacturing management, Pearson Prentice Hall, 1999.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Feedback information from graduated students		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	COMPUTER NETWORKS							
Code	FELA28	Year of study	3					
Course teacher	Julije Ožegović	Credits (ECTS)	5					
Associate teachers	Vesna Pekić, Ante Kristic	Type of instruction (number of hours)	L	S	AE	LE	DE	
			45	0	0	15	0	
Status of the course	Obligatory	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	Training students for: - Course provides fundamental knowledge of computer networks as computer engineering core.		
Course enrolment requirements and entry competences required for the course	None		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - argue fundamental terms and architecture of computer networks - present and compare ISO/OSI and TCP/IP protocol stacks - justify usage of TCP/IP protocol stack on application layer - evaluate usage of TCP and UDP protocols on transport layer - organize functionality of IP protocol, IP addressing and IP routing - plan LAN protocols and their functionality on physical and data layers - plan WAN protocols and their functionality on physical and data layers - organize addressing on physical, data, network and transport layers		
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Development of data communications networks. Basic characteristics. Switching methods.	3	0
	Importance of standardization. Open systems. Network elements. Channels, nodes, terminals.	3	0
	Computer and terminal network architecture. Hierarchical layered structures. ISO model.	3	0
	Protocols. Protocol mechanism: synchronization, addressing, flow control and error control.	3	0
	Quality of service. Traffic and congestion control, flow control.	3	0
	Physical level: DTE-DCE interface, RS232, X.24. Modem connections, intelligent modems. Signal codes.	3	0
	Local networks. Access methods. Ethernet.	3	0
	Wireless local networks. Digital subscriber networks: ISDN, xDSL. ATM.	3	0
	Data level: Error control. Cyclic codes.	3	0
	Character and bit oriented protocols. Frame-relay networks.	3	0
	Local networks: MAC, LLC. ATM networks. Ethernet. Wireless local networks.	3	0
	Network level: Packet networks. Traffic routing. Algorithms Bellman-Ford and Dijkstra.	3	0
	Internet. IP protocol (v4, v6), addressing, intranet, routing. Routing protocols OSPF and RIP	3	0
	Transport level: TCP and UDP Internet protocols. TCP protocol flow control.	3	0
	Queuing systems. M/M/1 system Little formula.	3	0
	List of laboratory or design exercises		LE or DE

<table>
<tr><td rowspan="9"></td><td colspan="5"></td><td>hours</td></tr>
<tr><td colspan="5">DTE DCE interface.</td><td>2</td></tr>
<tr><td colspan="5">Modem - data transfer using analogue telephone channel.</td><td>2</td></tr>
<tr><td colspan="5">Local network Ethenet.</td><td>2</td></tr>
<tr><td colspan="5">Connecting computer to Internet subnetwork.</td><td>2</td></tr>
<tr><td colspan="5">Connecting subnetwork to public Internet.</td><td>2</td></tr>
<tr><td colspan="5">Virtual local networks.</td><td>2</td></tr>
<tr><td colspan="5">Wireless local networks</td><td>2</td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Attend all forms of teaching, pass ingress and egress tests, perform 100% laboratory exercises, pass preliminary exams or full exam (numeric and theory).</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1,5</td><td>Research</td><td></td><td>Practical training</td><td>0,5</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Auditory exercises</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Individual learning</td><td>3</td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous assessment: laboratory tests, practical tests, knowledge tests, preliminary exams. Exam: written and oral (numeric and theory) as unity.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">1. Turk, S.: Računarske mreže, Školska knjiga, Zagreb, 1991..</td><td></td><td></td></tr>
<tr><td colspan="4">2. Rožić, N.: Informacije i komunikacije: kodiranje s primjenama, Zagreb 1992.</td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- Ožegović, J. Računalne mreže, Veleučilište u Splitu, 2000
- Lecture notes: Ožegović, J., Računalne mreže, continuously upgraded
- A. Kristić, V. Pekić: Upute za laboratorijske vježbe, Internet</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Lecture attending evidence
- Annual exam passing analysis
- Student feedback with teacher evaluation
- Teacher self-evaluation
- Graduated students feedback</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">DATABASES</td></tr>
<tr><td>Code</td><td>FELL01</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Vladan Papić, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Tea Marasović, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>30</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- Understanding how typical database work,
- Modelling, normalization and design of simple databases,
- Retreaval, input, deleting and updating of data using simple and complex SQL queries.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Explain basic terms used in databases, types and structures, methodology and life cycle,
- Use standard DBMS,
- Come up with queries for creation and retreaval of dana from tables,
- Translate given E-R diagram into relational form,
- Analyze relations in a database and conclude about level of normalization,
- Model simple databases according to given specification,
- Explain basic problems of databases working in multi user environment..</td></tr>
<tr><td rowspan="9">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Basic terms. File model. Database and database managament system. Physical and logical independence of data. Database design methodology.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Database models. Database types and structures. Database life cycle.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Data modelling. Steps in designing database. Entities and attributes. Relationship and relationship set. Functionality of relationship. Entity membership in relationships.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Representation of ER-model with diagram. Complex ER diagrams. Conceptual database design using ER-model. How to make data model in easiest way?</td><td>2</td><td></td></tr>
<tr><td colspan="5">Relational database model. Structure of relational database. Transfeer of ER model into relational model. Comparison of relational model with network and hierarhical models.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Normalization and normal forms. First normal form (1NF). Functional dependencies – basic definitions and terminology. Second normal form (2NF). Third normal form (3NF)</td><td>2</td><td></td></tr>
<tr><td colspan="5">Boyce-Codd normal form (BCNF). Multi-valued dependencies and forth normal form (4NF). Joining dependencies and fifth normal form (5NF). Normal form of keys and domains. Reasons for aborting with normalization.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Relational model operations. Relational algebra. Relational calculus.</td><td>2</td><td></td></tr>
</table>

	SQL (Structured Query Language). Processing of SQL instruction. Database definition using SQL (DDL). Modification of existing table. Deleting table. Indexes. Inserting data into tables.	2	
	Database queries. Simple queries on a relation. Search condition. Reports.	1	
	Queries on more than one relation. Query for table creation. Queries for insert, modification and deleting of dana. Aliases.	1	
	Aggregate functions. Group queries. Nested queries – subqueries.. Union. SQL queries optimization.	1	
	Multiuser environment problems. Views.	1	
	Protection from unautorizhed use. Ading privileges – single and cascade. Revoking priviledges. User groups. Data integrity and security. Time stamps.	2	
	Database storing and recovery. Database replication. Transaction log. Criteriums for DBMS evaluation.	2	
	List of laboratory exercises		LE hours
	Introduction to DBMS.		2
	ER-diagrams		2
	Transfering ER-diagrams into relational model		2
	Data modelling: etities and relationships.		2
	Creating writing dana into database.		2
	Filtering, sorting and searching for data.		2
	Simple queries.		2
	Complex queries.		2
	Input forms.		2
	Views and reports.		6
	Macro commands.		2
Format of instruction	☒ lectures ☐ seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)	
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
Class attendance	1,5	Research		Practical training	
Experimental work		Report		Individual work	2,2
Essay		Seminar essay		Laboratory exercises	0,5
Tests	0,2	Oral exam		Preparation for laboratory exercises	0,5
Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students are answering parts they did not pass in the midterms. The midterm and final exams are carried out as written tests and it lasts for max. 90 minutes. The requirement for passing grade is 40% points on each midterm exam or final exam and positive assessment of laboratory exercises. In final grading (in percentage), each midterm exam contributes with max. 40%, lab. exercises with max. 20% out of total possible points (40%+40%+20%). Final grade is formed in the following way: Percentage Grade

<table>
<tr><td></td><td colspan="3">50% to 61% sufficient (2)
62% to 74% good (3)
75% to 87% very good (4)
88% to 100% excellent (5)</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Papić, V. Databases, lectures. Textbook, FESB (in Croatian)</td><td></td><td>e-learning portal</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">An Introduction to Database Systems, Eighth Edition by C.J. Date, Addison Wesley 2003.
Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer D. Widom: Database Systems: The Complete Book, Prentice-Hall 2002.
Clare Churcher, Beginning Database Design From Novice to Professional, Apress, 2007.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">DESIGN & PROJECTING OF ALUMINIUM STRUCTURES</td></tr>
<tr><td>Code</td><td>261,262</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Asis.prof.dr.sc.Miro Bugarin
Prof.dr.sc.Željko Domazet</td><td>Credits (ECTS)</td><td colspan="5">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>6</td><td>24</td></tr>
<tr><td>Status of the course</td><td>electoral</td><td>Percentage of application of e-learning</td><td colspan="5">5</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- acquiring new and deepening existing knowledge in the field of designing and Design of aluminum structures in construction, engineering, automotive, industry train, ship building, interior design, etc..
- Introduction to advanced methods of designing and optimizing geometry extruded profiles and their use in the design of bearing skeletal structures, based on Eurocode standards
- Mathematical modeling and structural analysis, and numerical analysis of heat flows through structural systems aluminum structure smart envelope Building application of specialized computer tools,
- Preparing for independent design of new structural systems and technologies application of aluminum structures in the integration of renewable energy sources,
- Introduction to HR and EU standards in the field of design and implementation of energy efficient structural system made of aluminum.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Completed undergraduate university study Mechanical Engineering (130) or the study of Industrial Engineering (150)</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
1. their search and analyze complex technical systems in the field of aluminum skeletal structures,
2. Write and present project work on modern technological solutions in the field of new aluminum materials and construction solutions,
3. critically judge the features of the existing and new structural and functional concept of design solutions from aluminum alloys,
4. mathematical model and analyze the impact of active construction, energy and environmental parameters on the energy efficiency of the building envelopes,
5. suggest optimal structural and functional solution smart building envelopes in terms of minimum energy consumption, as well as the max. possible energy production, the integration of the HVAC systems of the building,
6. evaluate existing and new architectural solutions, building envelopes in terms of functional requirements defined by the standards set.</td></tr>
</table>

	7. measurements to determine the real value of the parameters for the evaluation of energy efficiency (air tightness, watertightness, noise immunity, insolation, heat transfer coefficient of building envelopes construction).		
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Definition, classification and typing of aluminum alloys	1	
	Structural and functional concept of technical systems aluminum skeletal structures	1	
	The design of structural components of extruded aluminum structures	2	
	Functional components and joining techniques of structural components of aluminum structures	2	
	Technical systems are active, dynamic and intelligent building envelopes from aluminum alloys	2	
	Sustainable design and design of smart aluminum functional structures: - Design, tolerance analysis in aluminum structures, - Design and analysis of glazing in aluminum structures, - Design and analysis of aluminum technical systems of protection from the sun - Design of aluminum components of green building envelopes: passive, NZBE, Plus EBE ...	4	
	The integration of technical systems of renewable energy in the aluminum structure of the smart envelopes and HVAC systems of buildings	2	
	The assessment of energy efficiency aluminum structure building envelopes: - Mechanisms and analysis of thermal energy transfer through the envelope of passive, active and intelligent system intelligent envelope, - Calculation of heat losses and gains through complex technical systems smart envelopes (continuous, semi-structural, structural, ventilated, double facades) - Assessment methods and checking air tightness, watertightness and dew of smart envelopes,	4	
	Computer tools for assessing energy efficiency and to optimize the geometry of extruded aluminum sections (simulation and stress analysis and heat transfer through the structures)	2	
	Application RETScreen tools to cost-benefit analysis of projects of aluminum structures in the integration of renewable energy sources	2	
	Technical regulations and HR and EU standards in the field of aluminum structures	2	
	Methods and techniques of measuring structural and thermal characteristics of aluminum structure of the building envelopes	2	
	Methods and techniques for testing of complex technical systems smart envelopes	2	
	The practical realization of aluminum structures, fabrication and installation	1	

<table>
<tr><td rowspan="11"></td><td colspan="6">Specification of aluminum structures in projects</td><td>1</td><td></td></tr>
<tr><td colspan="7">List of laboratory or design exercises</td><td>LE or DE hours</td></tr>
<tr><td colspan="7">The design geometry of cross sections of extruded aluminum profiles</td><td>4</td></tr>
<tr><td colspan="7">Designing tools for making extruded aluminum profiles</td><td>2</td></tr>
<tr><td colspan="7">Designing a skeletal aluminum constructions (space truss or frame)</td><td>4</td></tr>
<tr><td colspan="7">Structural analysis of skeletal structures with FrameWork and DUBAL programs</td><td>10</td></tr>
<tr><td colspan="7">Thermal analysis of the efficiency of the geometry of aluminum structures With TERM, OPTICS, WINDOW programs</td><td>6</td></tr>
<tr><td colspan="7">Measurement of thermal efficiency of a complex set of aluminum structures</td><td>2</td></tr>
<tr><td colspan="7">Measuring energy efficiency hybrid facade Al structures</td><td>2</td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>Format of instruction</td><td colspan="4">☒lectures
☒ seminars and workshops
☒ design exercises
☐ *on line* in entirety
☒partial e-learning
☒field work</td><td colspan="4">☒independent assignments
☒multimedia
☒ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="8">Active participation in all forms of teaching; lectures, consultations, literature search, independent work on modeling default problems and structural concept of skeletal aluminum constructions.</td></tr>
<tr><td rowspan="5">Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*</td><td>Class attendance</td><td>0,5</td><td>Research</td><td></td><td colspan="2">Practical training</td><td colspan="2">0,5</td></tr>
<tr><td>Experimental work</td><td>1</td><td>Report</td><td>1</td><td colspan="2">Design & Projecting exercises</td><td colspan="2">1</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td colspan="2">(Other)</td><td colspan="2"></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td colspan="2">(Other)</td><td colspan="2"></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>2</td><td colspan="2">(Other)</td><td colspan="2"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="8">The rating is determined as the mean:
• Quality Scores written final project aluminum construction,
• evaluating results of simulation and analysis of a given problem, and
• assessment of his oral presentation</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="5">**Title**</td><td colspan="2">**Number of copies in the library**</td><td>**Availability via other media**</td></tr>
<tr><td colspan="5">-Aluminium Extrude Manual, Aluminium extruders Council, 2016.
-Euro Codes 1991,1993,1999, Aluminium structures, 2011.</td><td colspan="2"></td><td>internet</td></tr>
<tr><td colspan="5">Winfried Heusler, Christian Kühn,Christine Nickl-Weller, Birgit Gebhardt, MartinHaas: *Building Envelopes for the 21st Century*, Schüco International KG, Winfried Heusler, 2013.</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5">Just Reckens, ISBN 3-00-0022321-6: *Facades & Architecture, Fascination in Aluminium and Glass*, Faculty of architecture, TU Delft</td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)	- G.Zemella, A.Faragum: *Evolutionary Optimisation of Facade Design, 2014.Springer.* - A.Aksamija : *Sustainable Facades: Design Methods for High Performance Building Envelopes,* Wiley, 2013. - M.Beever : *Smart Building Envelopes*, Project report, 2010. University of Cambridge, Department of Engineeering *Technology Roadmap: Energy efficient Building Envelopes*, International Energy Agency, Paris, 2013.
Quality assurance methods that ensure the acquisition of exit competences	• Evaluation of results in accordance with the stated learning outcomes • Feedback from students via surveys • Self-evaluation of teachers • Institutional and non-institutional checks
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">DESIGN FOR ASSEMBLY</td></tr>
<tr><td>Code</td><td>FETL26</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Nikola Gjeldum, Ph. D., Assistant Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marina Crnjac, Teaching assistant.
Ivan Peko, Teaching assistant.</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td><td>30</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0 %</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Objectives:
– Understanding and application of Design for Assembly basic principles
– Teach students to design a product with its elements in Siemens NX CAD software
– Teach student to design a product taking into account a simplicity and suitability of assembly process</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
– design a product elements in Siemens NX CAD software ("part design")
– connect designed product elements in assembly ("assembly design")
– generate designed product drawings ("drawing")
– redesign a product according to assembly process requirements
– make an assembly process plan for designed product</td></tr>
<tr><td rowspan="15">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L hours</td></tr>
<tr><td colspan="6">Introduction and basic principles. Historical development of product assembly process</td><td>2</td></tr>
<tr><td colspan="6">Product architecture</td><td>2</td></tr>
<tr><td colspan="6">Product design for assembly</td><td>2</td></tr>
<tr><td colspan="6">Methods of product design for assembly</td><td>3</td></tr>
<tr><td colspan="6">Measures and tolerances in assembly process</td><td>2</td></tr>
<tr><td colspan="6">Product design modifications</td><td>1</td></tr>
<tr><td colspan="6">Assembly process</td><td>2</td></tr>
<tr><td colspan="6">First midterm exam</td><td>2</td></tr>
<tr><td colspan="6">Making a plan for manual assembly process</td><td>2</td></tr>
<tr><td colspan="6">Chart of assembly process traceability</td><td>2</td></tr>
<tr><td colspan="6">Organizational structures in manual assembly process</td><td>2</td></tr>
<tr><td colspan="6">Lean methods for assembly processes</td><td>2</td></tr>
<tr><td colspan="6">Development from primary labor division phase to autonomous working groups</td><td>2</td></tr>
<tr><td colspan="6">Balancing of assembly process workstations</td><td>2</td></tr>
</table>

<table>
<tr><td rowspan="7"></td><td colspan="5">Second midterm exam</td><td>2</td></tr>
<tr><td colspan="5">List of design exercises</td><td>DE hours</td></tr>
<tr><td colspan="5">Introduction in Siemens NX CAD software</td><td>2</td></tr>
<tr><td colspan="5">Part design in Siemens NX</td><td>8</td></tr>
<tr><td colspan="5">Assembly design in Siemens NX</td><td>10</td></tr>
<tr><td colspan="5">Generating product drawings in Siemens NX</td><td>4</td></tr>
<tr><td colspan="5">Simulation in Siemens NX</td><td>2</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☒ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures and exercises in the amount of at least 70 % of the times scheduled.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td>1</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2,7</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0,2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0,1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During semester there are two midterm exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the first two final exams students that did not pass at least one of the midterm exams take part. In the third and fourth final exams students take the whole exam regardless results of midterm exams. The requirements for passing grade are positive assessment of individual project and positive assessment in exam. Positive assessment represents minimal 50% points on each midterm exam or minimal 50% points on final exam. Final exams are conducted in written form. Midterm exams and final exams consist of theoretical questions and numerical problems.

Grade (%) = (D + E) / 2

D – Individual project grade (%)
E – average points achieved on midterm exams expressed as a percentage or number of points achieved on the final exam expressed as a percentage.

E = (M1 + M2)/2
M1, M2 – average points achieved on midterm exams expressed as a percentage.

Grade (%): Final mark:
50% - 61% sufficient (2)
62% - 74% good (3)
75% - 87% very good (4)
88% - 100% excellent (5)</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Gjeldum, N.: "Dizajn za montažu", lectures on e-learning, FESB Split</td><td></td><td>Internet (e-learning)</td></tr>
</table>

	Marinescu, I., Boothroyd, G.: "Product design for manufacture and assembly", Marcel Dekker, New York, 2002.	1	
	Whitney Daniel E.: "Mechanical Assemblies – Their Design, Manufacture, and Role in Product Development", Massachusetts Institue of Technology, Oxford University Press, 2004.	1	
Optional literature (at the time of submission of study programme proposal)	1. A.J.D.Lambert Surendra M. Gupta: "Disassembly Modeling for Assembly, Maintenance, Reuse, and Recycling", CRC Press, 2000. 2. Molloy, O., Tilley, S., Warman, E.: "Design for manufacturing and assembly – Concepts, architectures and implementation, Springer Science + Bussines Media, 1998. 3. WEB publications on DFA		
Quality assurance methods that ensure the acquisition of exit competences	– keeping records of the attendance of students – annual evaluation of teachers – periodical evaluation of individual project advancement – feedback from students via surveys – self-evaluation of teachers – institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">DIPLOMA THESIS</td></tr>
<tr><td>Code</td><td>FEXX02</td><td>Year of study</td><td colspan="6">2</td></tr>
<tr><td>Course teacher</td><td></td><td>Credits (ECTS)</td><td colspan="6">30</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td colspan="2">DE</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td>Status of the course</td><td>Mandatory</td><td>Percentage of application of e-learning</td><td colspan="6"></td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:
- consolidating theoretical knowledge and practical skills in solving highly complex engineering problems,
- being independent in solving problems under the given conditions,
- applying scientific-research and ethical principles,
- writing and presenting the project results.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">Acquired 60 ECTS credits</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:
- To consolidate theoretical knowledge and practical skills in solving highly complex engineering problems
- To use literature, databases and other sources of information
- To select appropriate methods and procedures for solving the most complex engineering problems
- To apply scientific and technical knowledge and skills to effectively solve engineering problems
- To apply scientific research methodology and ethical principles in the science
- To give oral public presentation, to prepare written report and present project results</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="8">Diploma thesis is the independent work of the student produced according to the task and instructions given by the supervisor, and according to the scientific research methodology and ethical principles.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="5">☐ independent assignments
☐ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="8">Independent work</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>30</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table>

<table>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="3">Producing of the diploma thesis is evaluated by the supervisor based on the student's achievements during the process of preparing the diploma thesis. Commission for defence of the diploma thesis gives an assessment, representing an average grade for the preparation and defence of the thesis.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>1. Etički kodeks Fakulteta elektrotehnike, strojarstva i brodogradnje u Splitu
2. Zelenika, Ratko: Metodologija i tehnologija izrade znanstvenog i stručnog djela, Pisana djela na stručnim i sveučilišnim studijima, knjiga peta, Ekonomski fakultet u Rijeci, Rijeka, 2011.
3. Žugaj, Miroslav; Dumičić, Ksenija; Dušak, Vesna: Temelji znanstvenoistraživačkog rada, Metodologija i metodika, Fakultet organizacije iinformatike, Varaždin, 2006.

Literature depends on the given problem. The literature list may be given by the supervisor or the student should find the appropriate literature to help solve the problem.</td><td></td><td>Web site of the Faculty</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Self-evaluation of teachers
- Student survey of the whole study programme</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

NAME OF THE COURSE	**ECONOMIC TREATMENT OF MATERIALS**						
Code	FETL08	Year of study	1				
Course teacher	Nedjeljko Mišina, Ph. D., Full Professor	Credits (ECTS)	5				
Associate teachers		Type of instruction (number of hours)	L	S	AE	LE	DE
			30	0	0	0	30
Status of the course	Obligatory	Percentage of application of e-learning	0				

COURSE DESCRIPTION	
Course objectives	Training students to: 1. Introduction to the inventory of raw materials in the world and in our country, and the life cycle of materials 2. Recognizing the phenomenon of fractures and damage to materials 3. Understanding the connection between structure and mechanical properties of materials 4. Presentation of corrosion processes and methods of protection 5. Training for the use of different methods of repair of damaged machine parts and constructions 6. Acquiring the latest knowledge about steels, non-ferrous metals, adhesions, composites, metal foams, solders, polymers, ceramics and wood as a structural material
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1. Describe and identify the cause breakage or damage the component or structure 2. To analyze the impact of the structure of materials on the phenomenon of fracture or damage to materials 3. Determine technology repair of the component or structure of some welding processes, welding, soldering or metallization 4. Determine the need for conducting heat treatment in order to relieve the residual stresses, and prescribe technology 5. To demonstrate the testing of mechanical properties of materials using laboratory equipment and testing of welded joints non-destructive methods

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	AE hours
	Distribution of materials and their properties	2	0
	Permanent static strength, aging steel	2	0
	The fragility of failure, brittle fracture	2	0
	Technologicality, economy and exploitability products	2	0
	Technology of structural steel construction	2	0

	Legislation for manufacturing welded structures	2	0
	Repair of machine parts	2	0
	First midterm exam		
	Residual stresses and failure modes	2	0
	Special steels and their application	2	0
	Inventories of raw materials in the world. The life cycle of products and materials	2	0
	Product requirements and criteria for the selection of materials	2	0
	The methodology of choice of materials and the method of election materials in practice	2	0
	The recycling of materials. The problems, costs and effects of recycling.	2	0
	Second midterm exam		
	List of laboratory or design exercises		DE
	Seminar paper from the choice of materials		5
	Recycling of materials		5
	Technology of machine parts		5
	Repair of machine parts		5
	Technology of welded structures		6
	First midterm exam		
	Second midterm exam		

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence in lectures and exercises in the amount of at least 70%. Performed all required seminar exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1	Research		Practical training	
	Experimental work		Report		Self-directed learning	3
	Essay		Seminar essay	1	Laboratory exercises	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	During the semester there will be two mid-term exams (tests). The first mid-term, after 7 weeks of classes and the second after the next 6 weeks of classes. At the final exam students have to take part material that did not pass the mid-term. Each test is carried out as written exam lasting 45 minutes. The requirements for a positive evaluation are: positive assessment of seminar exercises and 50% points on each test. The final grade is based on the resulting percentage on mid-term exams. Percentage - Rating 50% to 61% - sufficient (2)

<table>
<tr><td></td><td colspan="3">62% to 74% - good (3)
75% to 87% - very good (4)
88% to 100% - excellent (5)
Examinations according to the Faculty schedule!

The final grade is determined after the second final exam, applying the absolute ECTS grading system in accordance with the study rules and study system of the University of Split. Students who did not pass the exam after two final exams have the last chance to pass exam in the autumn period. Overall material has to be passed at last possible exam.The exam lasts 90 minutes.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>N. Mišina: the author's lecture, FESB</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. T. Filetin: Izbor materijala I razvoj proizvoda, FSB, Zagreb, 2000.
2. M.F. Ashby: Materials Selection and Mechanical Design, 3rd edition, Butterworth Heinemann, Oxford, 2001.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">ELECTRICAL DRIVES</td></tr>
<tr><td>Code</td><td>FENL01</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>Božo Terzić, Ph. D., Full Professor
Marin Despalatović, Ph. D., Associate Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Goran Majić, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>15</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students to:
- Get familiar with principle of operation and application areas of various types of electric machinery,
- Apply acquired knowledge in the analysis of existing and design of a new electrical drives.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
1. Compare the mechanical characteristics of the electric motors with the working mechanisms (loads),
2. Present procedures for determining steady state and dynamic characteristics of various parts of electrical drive system,
3. Estimate the system state variables based on the measurement of electrical and/or mechanical quantities,
4. Justify the choice of controlled or uncontrolled electrical drive,
5. Identify the causes of errors and instability in the observed system,
6. Propose an electric motor to meet technical and economic requirements,
7. Analyze the system characteristics based on tools for computer modeling and simulation of electric drives.</td></tr>
<tr><td rowspan="5">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="3">Course content</td><td colspan="2">L or S hours</td><td colspan="2">AE hours</td></tr>
<tr><td colspan="3">Introduction, basic terms and definitions, problems and areas of application of electric drives (ED). The main states of the EDs. Working and braking modes of ED. The characteristics of the various (loads) working mechanisms. The steady state of the ED.</td><td colspan="2">2</td><td colspan="2">1</td></tr>
<tr><td colspan="3">Structure and principle of operation of commutator machines. Types of excitation: independent, shunt, serial, compound, permanent magnets. Types of commutator machines: DC, AC, universal. Steady states and external characteristics of separately and/or serial excited commutator machines.</td><td colspan="2">2</td><td colspan="2">1</td></tr>
<tr><td colspan="3">Braking states of DC motor drive: generator, counter-current and electrodynamic braking. Converter controlled DC motor drive. Ward Leonard speed control system. DC motor drive powered from chopper, single-phase and three-phase thyristor converters.</td><td colspan="2">2</td><td colspan="2">1</td></tr>
<tr><td colspan="3">Structure and principle of operation of slip ring and squirrel cage induction machines. Steady state and external (mechanical) characteristics of induction machines drives. Braking states of induction motor drive: generator, counter-</td><td colspan="2">2</td><td colspan="2">1</td></tr>
</table>

	current, electrodynamic and DC braking.		
	Converter controlled induction motor drive. Principle of operation and various topologies of frequency converters. Advantages and disadvantages of scalar, vector and direct torque control. Comparison of induction motor characteristics when operated with constant stator or mutual flux linkage, or constant stator current. Subsynchronous cascade. Thyristor converter fed induction motor for adjusting drive speed.	2	1
	Structure and principle of operation of synchronous machines. Various types of synchronous machines: round rotor, salient poles, reluctance, permanent magnet. Steady state and external (mechanical) characteristics of EDs with synchronous machines. Braking states of synchronous motor drive.	2	1
	Materials for permanent magnets. ED with electronically commutated motor and a synchronous motor with permanent magnets. Structure and principle of operation of special types of machines: linear, high-speed and torque motors.	2	1
	First midterm exam	2	1
	The dynamics of the EDs. The stability of operating point. Startup and sudden load of separately excited DC motor. Definition of the electro-mechanical time constant and the constant of inertia.	2	1
	The dynamics of induction motor drives: startup and sudden load. Energy losses under transients. Multi-speed and Dahlander pole changing induction motors.	2	1
	Starting methods to limit starting current and torque of DC and AC machine drives, starters, star-delta and soft (thyristor controlled) startup. The heating and cooling performance of electric machines.	2	1
	The types of loads (S1-S10). Technical and economic aspects of electric machine selection. The selection of controlled or uncontrolled ED, energy savings. Examples of EDs: a conveyer and an electric vehicle.	2	1
	Estimation of system state variables based on the nominal data and measurements of electrical and/or mechanical quantities, the balance of power. The law of similarity, comparison of various types and sizes of electric machines.	2	1
	Protection, monitoring and diagnostics of EDs. The causes of errors and instability.	2	1
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours
	1. Steady state characteristics of separately excited DC motor.		2
	2. Electrodynamic braking of separately excited DC motor.		2
	3. Thyristor converter fed DC motor drive.		2
	4. Frequency converter fed induction motor drive.		2
	5. Steady state characteristics of an induction motor.		2
	6. Transients in DC and induction motor drives.		2
	7. Starting of an induction motor.		2
	8. Electronically commutated (BLDC) motor drive.		1
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)	

<table>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70% of the times scheduled.
Performed all laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1,5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2,3</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Laboratory exercises</td><td>0,5</td></tr>
<tr><td>Tests</td><td>0,1</td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td>0,5</td></tr>
<tr><td>Written exam</td><td>0,1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterm exams during semester. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. By midterm exams students can pass the entire exam. On the exam (final, correctional and commission) students take the parts of material which they did not pass on the midterm or previous exams. A separate part of the material means the material of each midterm exam. The exams are carried out as written tests. The duration of the midterm exams are 60 minutes, while exams are 2x60 minutes.

The requirement for passing grade is at least 50% of points on each (midterm) exam and the positive assessment (minimum 50% of points) of all laboratory exercises. Grade (in percentage) is formed as follows:

Grade(%) = 0,4•(ME1 + ME2) + 0,2•LE
where
ME1, ME2 - points obtained at (midterm) exams expressed in percentages
LE - average grade of all laboratory exercises expressed in percentages

The final grade is determined as follows:

Percentage — Grade
0% to 49% — insufficient (1)
50% to 61% — sufficient (2)
62% to 74% — good (3)
75% to 87% — very good (4)
88% to 100% — excellent (5)

Examinations are held in accordance with the course calendar schedule.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">M. Jadrić, B. Terzić: Elektromotorni pogoni, Interna skripta, FESB, Split, 2007.</td><td></td><td>e-learning portal</td></tr>
<tr><td colspan="4">B. Jurković: Elektromotorni pogoni, Školska knjiga, Zagreb, 1990.</td><td>6</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">I. Boldea, S. A. Nasar: Electric Drives, Taylor & Francis, Boca Raton, 2006.
B. K. Bose: Power Electronics and Variable Drives, IEEE Press, New York, 1997.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Keeping records of students course attendance
- Annual review of the performance of the examinations
- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers</td></tr>
</table>

	- Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">ENERGY EFFICIENCY IN BUILDINGS</td></tr>
<tr><td>Code</td><td>FESL24</td><td>Year of study</td><td colspan="6">2.</td></tr>
<tr><td></td><td></td><td></td><td>30</td><td>0</td><td>30</td><td>0</td><td colspan="2">0</td></tr>
<tr><td>Status of the course</td><td>Elective.</td><td>Percentage of application of e-learning</td><td colspan="6"></td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:
- Consider and analyse energy consumption in the buildings,
- Obtain techno-economic aspect of proposed energy efficiency measures in building facilities.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">Thermodynamics 1, Mathematics 1, Mathematics 2.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:
- Consider base terms and concepts from the field of energy efficiency in buildings as well as sustainable development in general,
- Analyse energy consumption in buildings,
- Elaborate existing legislative related to the energy efficiency in buildings,
- Analyse and propose energy efficiency measures in buildings,
- Evaluate economic aspect of proposed energy efficiency measures.</td></tr>
<tr><td rowspan="11">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="4">Course content</td><td colspan="2">L or S hours</td><td colspan="2">AE hours</td></tr>
<tr><td colspan="4">Introduction to the energy efficiency in buildings.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Analysis of the energy consumption for different buildings.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Legislative related to the energy efficiency in buildings.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Introduction to the energy efficiency measures in buildings (passive and nearly zero buildings, high energy performance buildings).</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Energy efficiency measures related civil engineering aspect (building thermal envelope, openings, passive architecture elements, etc.)</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Energy efficiency measures in heating systems and hot water preparation.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Energy efficiency measures in heating systems and hot water preparation.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Energy efficiency measures in cooling (air-conditioning) systems.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Energy efficiency measures in cooling (air-conditioning) systems.</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
<tr><td colspan="4">Renewable energy sources in buildings (implementation).</td><td colspan="2">2 hours</td><td colspan="2">2 hours</td></tr>
</table>

	Calculation techniques for carbon-dioxide emissions.	2 hours	2 hours
	Energy audit.	2 hours	2 hours
	Building energy certification.	2 hours	2 hours
	Introduction to the economic indicators related to the evaluation of the energy efficiency measures.	2 hours	2 hours
	Economic evaluation of the proposed energy efficiency measures.	2 hours	2 hours
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required auditorium exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research	2	Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project	1	(Other)	

Grading and evaluating student work in class and at the final exam	

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Nižetić, Online predavanja; Energetska učinkovitost u zgradarstvu, 2011, FESB.		
	Energy Efficiency in Buildings'' – Guide F, CIBSE, 2004.		
	Energy Efficiency Guide for Existing Commercial Buildings'', Guide, ASHRAE, 2009.		

Optional literature (at the time of submission of study programme proposal)	-Skupina autora, "Priručnik za energetske savjetnike", UNDP, Zagreb 2008, -Skupina autora, "Tipske mjere", UNDP, Zagreb 2009, -Skupina autora, "Priručnik za ventilaciju i klimatizaciju", EGE, 2003, -Skupina autora, "Priručnik za grijanje", EGE, 2005.
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**ENGINEERING DESIGN**							
Code	FESL09	Year of study	2					
Course teacher	Tonči Piršić, Ph. D., Asociate Professor	Credits (ECTS)	5					
Associate teachers		Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	0	0	30	
Status of the course	Obligatory	Percentage of application of e-learning	40%					
COURSE DESCRIPTION								
Course objectives	Training students for: -							
Course enrolment requirements and entry competences required for the course	Technical Drawings, Mechanics, Strength of Materials, Machine Elements							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Ability of designing the mechanical engineering constructions and usage of CAD 3D Parametric Modelling							

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction to Metodical Engineering Design. Processes and types of Engineering Design.	4	
	Lists of requirements. Conceptual design. Target function.	4	
	Establishing functional structures. Searching for solution principles to fulfil the sub-functions.	4	
	Morphological matrix. Evaluating concept variants against technical and economic criteria. Embodiment design.	2	
	Computer-aided design. Computers features.	4	
	Methods and methods programming. Algorithms of engineering design. Automation in engineering design.	8	
	Development of typical engineering design algorithms. 3D Parametric Modelling of constructions.	2	
	List of laboratory or design exercises		LE or DE hours
	Project of typical engineering product chosen by student.		14
	3D Parametric Modelling of bearing sliding bearing.		14

<table>
<tr><td rowspan="2"></td><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled.
Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">1. E. Oberšmit: Nauka o konstruiranju, Metodičko konstruiranje i Konstruiranje pomoću računala, Sveučilišna naklada Liber, Zagreb, 1989.</td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">1 G. Pahl, W. Beitz: Engineering Design, Springer - Verlag 1988.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Lectures responsible for the same subject area collaborate closely and monitor each other's work. Occassional class observations and appraisal by Head of Department</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">ENGINEERING MAINTENANCE</td></tr>
<tr><td>Code</td><td>FETL04</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Jani Barle, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Stipe Perišić, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>CE</td></tr>
<tr><td>45</td><td>0</td><td>0</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Upon completion the student will be able to critically evaluate and compare various concepts related to technical system life assessment, usage, maintenance and safety.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
1. Evaluate different actions and suggest maintenance strategy.
2. Comment maintenance procedures and risks associated with usage.
3. Link different reliability and availability modeling concepts.
4. Estimate availability and maintenance costs.
5. Compare impacts on technical system endurance.</td></tr>
<tr><td rowspan="16">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L hours</td><td>LE hours</td></tr>
<tr><td colspan="5">The role and scope of the maintenance engineering. Historical aspects, principles and applications of maintenance actions (corrective, preventive, predictive, proactive). RCM and TPM strategies. Bathtub curve.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Maintenance-related case studies.</td><td></td><td>1</td></tr>
<tr><td colspan="5">Standards (IEC EN 61508). Maintenance assets register. Technical performance indicators. Failure, failure cause, failure mode and consequence. Failure Mode and Effect Analysis (FMEA) and Root Cause Analysis (RCA).</td><td>3</td><td></td></tr>
<tr><td colspan="5">FMEA examples.</td><td></td><td>1</td></tr>
<tr><td colspan="5">An overview of the failure modes. Human errors in maintenance. Nonparametric life estimate procedures and parametric life models.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Nonparametric life data analysis procedures - 1.</td><td></td><td>1</td></tr>
<tr><td colspan="5">Reliability and availability data sources, standards and recommendations. Analysis of complete and censored data.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Nonparametric life data analysis procedures - 2.</td><td></td><td>1</td></tr>
<tr><td colspan="5">Parametric reliability models of component. Constant and time-dependent failure models (Exponential, Weibull, Log-normal). Probability plots. Maximum likelihood. Confidence interval.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Parametric life data analysis - 1.</td><td></td><td>1</td></tr>
<tr><td colspan="5">Reliability of systems. Reliability block diagrams (RBD): serial configuration and redundancy models.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Parametric life data analysis - 2.</td><td></td><td>1</td></tr>
<tr><td colspan="5">Maintainability and Availability. Overview of the factors that influences maintainability.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Maintainability case studies.</td><td></td><td>1</td></tr>
<tr><td colspan="5">Repairable items. Markov model fundamentals. Load-sharing. System deterioration models with and without repair. Counting</td><td>3</td><td></td></tr>
</table>

	processes (HPP and NHPP).		
	Examples of the repairable items.		1
	Data sources and/or expert judgments. Burn-In. Bayesian analysis in formal safety assessment (FSA).	3	
	Reliability data sources - examples.		1
	The role and applications of technical diagnostics. Procedure, types, indicators and sensors.	3	
	Technical diagnostics case studies.		1
	Physical reliability models. Accelerated testing and burn-in procedures.	3	
	Covariate damage models.		1
	Planning, purchasing and storage of maintenance-related actions and inventory.	3	
	Width and depth of spare parts stock.		1
	Optimal preventive maintenance scenarios and models. Maintenance information system, documents and organization structure.	3	
	Numerical analysis of optimal preventive maintenance model.		1

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ individual assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ individual project (other)
Student responsibilities	Class attendance, tests, project presentation and oral exam.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report	0,5	Individual work	2,0
	Essay		Seminar essay		Lab exercises	0,3
	Tests	0,2	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam

There are two midterms and final exams. The first midterm exam is after 7-week session classes and the second one is after the next 6 weeks. The first midterm is carried out as written test on basic issues covered within the first session. The second midterm is seminal paper on selected and more advanced topic. Selected topic must be discussed with respect to the course framework. The requirement for passing grade is the positive assessment on each midterm exam (>49%) or the final exam.
The final score is:

$$Score\ (\%) = 0,35 \times A_1 + 0,35 \times A_2 + 0,20 \times A_3 + 0,10 \times A_4$$

- *midterm 1: A_1 = 50 – 100 %,*
- *midterm 2 (seminal paper): A_2 = 50 – 100 %,*
- *oral exam: A_3 = 50 – 100 %.*
- *class attendance: A_4 = 70 – 100 %.*

Score	Grade
50% - 62%	sufficient (2)
63% - 76%	good (3)
77% - 88%	very good (4)
89% - 100%	excellent (5)

Required literature (available in the	Title	Number of copies in the	Availability via other media

library and via other media)		**library**	
	Barle, J.: Reliability in maintenance management, (student handbook in Croatian: *Pouzdanost u funkciji održavanja tehničkih sustava*), FESB, Split, 2009.		e-learning portal
Optional literature (at the time of submission of study programme proposal)	Rausand, M.; Høyland, A., "System Reliability Theory: Models, Statistical Methods, and Applications", 2nd ed., Wiley-Interscience, 2003. Ebeling, C., "An Introduction To Reliability and Maintainability Engineering", McGraw-Hill, 1996. Rausand, M., "Reliability of Safety-Critical Systems: Theory and Applications", Wiley, 2014.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">ENGINES AND VEHICLES</td></tr>
<tr><td>Code</td><td>FESL41</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td>Course teacher</td><td>Željan Lozina, Ph. D., Full Professor
Gojimir Radica, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Nikola Matulić, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>15</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Electives</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">To teach the students basics of the vehicle dynamics and the power engines.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1) Determine kinematic and forces of crankshaft mechanism.
2) IC engine working cycle modelling and fuel consumption and emission evaluation.
3) Ability to perform longitudinal and transversal dynamic analysis on basic models.
4) Perform vertical dynamics of vehicle on simple models.
5) Analyze noise sources in vehicle and apply noise and vibration control principles.</td></tr>
<tr><td rowspan="22">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td colspan="5">CDIO approach is implemented:</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Kinematic and forces of crankshaft mechanism</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Combustion and working fluid flow circle.</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">IC engine modelling.</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Testing procedure.</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Engine efficiency and possibility of improvement.</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Emissions and emission regulation.</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">First midterm exam</td><td></td><td></td></tr>
<tr><td colspan="5">Introduction to vehicle dynamics</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Longitudinal vehicle dynamics</td><td>3</td><td>0</td></tr>
<tr><td colspan="5">Transversal vehicle dynamics</td><td>3</td><td>0</td></tr>
<tr><td colspan="5">Vertical vehicle dynamics</td><td>3</td><td>0</td></tr>
<tr><td colspan="5">Noise sources in vehicles and control principles.</td><td>2</td><td>0</td></tr>
<tr><td colspan="5">Second midterm exam</td><td></td><td></td></tr>
<tr><td colspan="6">List of laboratory exercises</td><td>LE hours</td></tr>
<tr><td colspan="6"></td><td></td></tr>
<tr><td colspan="6"></td><td></td></tr>
<tr><td colspan="6"></td><td></td></tr>
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<tr><td></td><td colspan="6"></td><td></td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ *on line* in entirety
☐ partial e-learning
☐ field work</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="7">The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*</td><td>Class attendance</td><td>2,0</td><td>Research</td><td></td><td>Practical training</td><td colspan="2"></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td colspan="2">2,9</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Laboratory exercises</td><td colspan="2">0</td></tr>
<tr><td>Tests</td><td>0</td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td colspan="2">0</td></tr>
<tr><td>Written exam</td><td>0,1</td><td>Project</td><td></td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="7">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of 10 theoretical questions and numerical problems and final tests consist of 20 theoretical questions and numerical problems. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula:
Grade(%) = 0,5 (M1 + M2)
the activities in percentage:
• M1, M2 – test results.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="5">**Title**</td><td>**Number of copies in the library**</td><td>**Availability via other media**</td></tr>
<tr><td colspan="5">Ž. Lozina: Autorizirana predavanja, FESB</td><td></td><td>e-learning portal</td></tr>
<tr><td colspan="5">G. Radica: Autorizirana predavanja, Motori-modeliranje, FESB</td><td></td><td>e-learning portal</td></tr>
<tr><td colspan="5"></td><td></td><td></td></tr>
<tr><td colspan="5"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="7"></td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="7">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="7"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">ENGLISH LANGUAGE FOR ACADEMIC PURPOSES</td></tr>
<tr><td>Code</td><td>FEOL02</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td>Course teacher</td><td>Daniela Matić, Ph.D., Assistant Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">/</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>0</td><td>45</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">This course is aimed at:
- introducing students to basic scientific discourse in English with a view of improving their writing and speaking skills needed for work in academic environment or further education at foreign institutions
- helping students acquire and enhance knowledge on foreign language structures;
- help students improve English for special purposes knowledge at receptive level (written and oral reception) depending on the course of studies;
- help students raise awareness of their own responsibility in learning process.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- recognize and eventually use various grammar structures and lexis typical in discourse of science and technology;
- recognize various text types, textual patterns and language activities;
- apply various reading techniques (skimming, scanning) when analyzing authentic texts;
- identify and explain professional vocabulary;
- recognize key ideas, words and sentences;
- use various g and listening methods in order to comprehend the context of authentic general English and professional texts;
- present various topics orally and in written form;
- analyze various professional materials and present them within professional communication procedures.</td></tr>
<tr><td rowspan="5">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="3">Course content</td><td colspan="2">L or S hours</td><td colspan="2">AE hours</td></tr>
<tr><td colspan="3">Unit 1 – Education- 1A – reading and understanding short informative texts; reading for the main idea and for detail; note-taking, writing a summary; 1B understanding essay titles; paraphrasing</td><td colspan="2">3</td><td colspan="2"></td></tr>
<tr><td colspan="3">Unit 1 – 1C Listening for the main idea; note-taking; noun phrases</td><td colspan="2">3</td><td colspan="2"></td></tr>
<tr><td colspan="3">Unit 1 – 1D Speaking –preparing for and taking part in a seminar discussion; summarizing and reporting on a seminar discussion, using a dictionary;</td><td colspan="2">3</td><td colspan="2"></td></tr>
<tr><td colspan="3">Reading a scientific paper-analyzing the organization of the paper, explaining, paraphrasing
Unit 2 – Systems – 2A - understanding and extracting key information; recognizing and writing definitions; summarizing</td><td colspan="2">3</td><td colspan="2"></td></tr>
</table>

	key factual information		
	Reading a scientific paper Unit 2 – 2B- identifying the language and features of visual information; writing a short description of visual information; using noun phrases containing relative clauses.	3	
	Reading a scientific paper Unit 2 – 2C- recognizing key factual information in a lecture, recognizing definitions in a lecture, note-taking with abbreviations and symbols; 2D - recognizing language for referring to visual information; recognizing noun phrases in explanations; presenting visual information	3	
	Unit 2 – building academic vocabulary Unit 4 – *Order* – 4D-Presentations-evaluating presentation guidelines; using signposting language to refer to visual information;	3	
	8. Mid-term exam	3	
	Unit 3 – *Communication* – 3A - identifying main ideas and supporting evidence in a text; building word families, using adverbs to express stance; 3B - analyzing and writing topic sentences; adding supporting evidence using reasons and examples; writing and evaluating a paragraph	3	
	Unit 3 – 3C - understanding the main ideas in a lecture; recognizing the language for introducing main ideas and supporting evidence, analyzing types of supporting evidence: examples, definitions and explanations.	3	
	Reading a scientific paper Unit 3 – 3D - reading a text to prepare for a tutorial; identifying assumptions in questions; participating in tutorial discussions; inferring the meaning of unknown words in sentences.	3	
	Reading a scientific paper Unit 4 – *Order* – identifying the purpose and structure of a text; using classification to make notes; 3B – analyzing an essay introduction; writing and evaluating a thesis statement and an essay introduction.	3	
	Reading a scientific paper Unit 4 – 4C – understanding the organization of a lecture; recognizing and practicing signposting language; note-taking using diagrams. Academic vocabulary in use.	3	
	Presentations Unit 4 – Categorizing words; creating and using classification phrases. Academic vocabulary in use.	3	
	15. End-of-term exam	3	
Format of instruction	☐ lectures ☒ seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)	

<table>
<tr><td>Student responsibilities</td><td colspan="6">In order to take an exam and eventually obtain a grade, each student has to fulfill the following requirements:
- minimum class attendance of 70%;
- delivered and positively graded presentation in English before other students during regular classes.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td>1</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td>/</td><td>Report</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td>/</td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>2</td><td>Oral exam</td><td>/</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>/</td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During regular classes students are supposed to prepare and deliver a presentation on a topic of their choice, which will also be graded.
During the semester, students will be continuously assessed as they will take two exams, a mid-term and an end-of term exam. The former will be held in week 8 and the latter in week 15. Both exams will test their knowledge of English naval architecture lexis from the educational materials and grammar structures specific for their profession. If they fail at either of these exams or do not sit for them, they have to take the final exam scheduled in the examination period after the classes have finished.
The final grade is calculated as follows:
- written exam (mean of mid-term and end-of term exam positive results, or final exam) – 70%
- positively graded presentation – 20%
- regular attendance – 5%
- written assignments (homework) – 5%
All exams are scheduled according to the current academic year calendar.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">1. de Chazal, Edward, Sam McCarter. (2012). Oxford EAP: A Course in English for Academic Purposes. Upper-intermediate/B2. Oxford: OUP.</td><td></td><td></td></tr>
<tr><td colspan="4">2. McCarthy, Michael, Felicity O'Dell. (2008). Academic Vocabulary in Use. Cambridge: CUP.</td><td></td><td></td></tr>
<tr><td colspan="4">3. Master, Peter. (2004). English Grammar and Technical Writing. Washington: Office of English Language Programs of the United States Department of State.</td><td></td><td></td></tr>
<tr><td colspan="4">4. Paterson, Ken, Roberta Wedge. (2013). Oxford Grammar for EAP. Oxford University Press.</td><td></td><td></td></tr>
<tr><td colspan="4">5. Oxford Learner's Dictionary of Academic English. Oxford University Press.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme</td><td colspan="6">1. Powell, Mark. (2010). Dynamic Presentations. Cambridge: CUP.
2. Silobrčić, Vlatko. (2003[5]). Kako sastaviti, objaviti i ocijeniti znanstveno djelo.</td></tr>
</table>

proposal)	Zagreb: Medicinska naklada.
Quality assurance methods that ensure the acquisition of exit competences	- Regular class attendance records - Tutorials - Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	/

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">EVALUATION OF INDUSTRIAL PROJECTS</td></tr>
<tr><td>Code</td><td>FESL33</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Damir Vučina, Ph. D., Full Professor, Željan Lozina, Ph. D., Full Professor
Marija Šiško Kuliš, Ph. D., Associate Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Igor Pehnec, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">The aim of the course is that students acquire knowledge about the impact of revenues, operating costs and capital investment on the cash flows of the project, and about the financial efficiency analysis the projects. Special attention will be paid to methods of evaluation and assessment of the success of the project.
The course is designed as a combination of lectures and practical work in which the students, based on practical examples, have the opportunity to analyze the project and learn how to create the process and criteria for making good investment decisions.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">After completing the course the students will be able to:

- interpret the concept, content and purpose of the development of the investment project
- Evaluate of sales and purchase market, possibility to sell their own products or services and projections of revenue, cost and required investment.
- Construct the planned financial statements.
- Evaluate the justification of investments by using static and dynamic approach to profitability.
- Make sensitivity analysis of the project.
- Clearly and unambiguously present their own investment project that will support the justification of investment</td></tr>
<tr><td rowspan="10">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction to business planning; project, project types</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Project life cycle</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Elements of the feasibility study</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">SWOT analysis</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Technical and technological elements of investment</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Analysis of material resources</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Market Analysis, Project risks management</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">First mid-term exam</td><td></td><td></td></tr>
<tr><td colspan="5">Projection of the income statement, Projection of the financial</td><td>2</td><td>2</td></tr>
</table>

	and economic flow of the project		
	Projection of the balance sheet	2	2
	Static evaluation of the project: Financial indicators	2	2
	Dynamic evaluation of the project: The payback period of the project; Net present value (NPV); Relative net present value (RNPV); Internal Rate of Return (IRR);	2	2
	Calculation of the net present value of the project and the internal rate of return	2	2
	Rating uncertainties of the project: Analysis of profitability threshold and sensitivity analysis of the project	2	2
	Second mid-term exam		

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☐ laboratory ☒ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	0.5	Research		Practical training	
	Experimental work		Report		Individual work	
	Essay		Seminar essay		Laboratory exercises	
	Tests	1	Oral exam	0.5	Preparation for laboratory exercises	
	Written exam		Project	3	(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. On the final tests students take a part of teaching materials that did not pass on midterm. Each midterm carried out as oral exams for period of 75 minutes and consists of about 10 questions. Test is based on a project which the students independently write. The requirement for a positive evaluation is a positive evaluation of the self-generated project. The final grade (in percent) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) the activities in percentage: • M1, M2 – midterms test results.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	M. Šiško Kuliš: Authorized lectures, FESB		e-learning portal
	M. Šiško Kuliš: Authorized workbook, FESB		e-learning portal
	S. Orsag: Budžetiranje “Kapitala procjena investicijskih projekata”, Masmedia, 2002, Zagreb	0	

Optional literature (at the time of	Financial and Economic Analysis of Development Projects, European Commission Methods and Instruments for Project Cycle Management, Working Team

submission of study programme proposal)	coordinated by Professor Massimo Florio, Office for Official Publications of the European Communities, Luxembourg, 1997.
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Attendance in class tracking - Yearly analysis of the success of the examinations - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">FATIGUE STRENGTH OF MATERIALS</td></tr>
<tr><td>Code</td><td>FESL04</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Željko Domazet, Ph. D., Full Professor
Lovre Krstulović-Opara, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Petra Bagavac, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>30</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Obligatory (262)
Mandatory (261, 263)</td><td>Percentage of application of e-learning</td><td colspan="5">40%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- Proper and optimal dimensioning of structural and machinery components subjected to loadings during exploitation.
- Estimating real exploitation loading by means of strain gauge measurements and infrared thermography.
- Detection of cracks by means of ultrasound testing, penetrant testing and magnetic particles inspection.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Explain fatigue limit and stress concentration.
- Describe methods of estimating fatigue strength.
- Describe methods of fracture's repair.
- Describe strain gauge method.
- Describe ultrasound method in detection of cracks.
- Describe penetrant testing in detection of cracks.
- Describe magnetic particles inspection of cracks.</td></tr>
<tr><td rowspan="16">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction to experimental mechanics in fatigue evaluation.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Methods of fatigue evaluation.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Materials response under in-service loading conditions.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Types and characteristics of structural loads (actions on structures).</td><td>2</td><td></td></tr>
<tr><td colspan="5">Influences on life time predictions of materials and components.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Concepts and methods of fatigue strength.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Fracture mechanics.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Stress concentration.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Design of components and structures.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Codes.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Repair and retrofit of fatigue damages.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Fatigue strength of weldments-</td><td>2</td><td></td></tr>
<tr><td colspan="5">Experimental mechanics in fatigue evaluation and case studies.</td><td>2</td><td></td></tr>
<tr><td colspan="6">List of laboratory or design exercises</td><td>LE hours</td></tr>
<tr><td colspan="6">Introduction to experimental testing equipment of Structural laboratory.</td><td>1</td></tr>
</table>

	Strain gauge testing – theory and application of strain gauges.	10
	Penetrant testing.	2
	Magnetic particles inspection.	2
	Basics of infrared thermography	6
	Thermoelasticity, pulsed thermography and Risitano method.	4
	Ultrasound testing.	3
Format of instruction	☒ lectures ☒ seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work	1	Report		Individual work	1
	Essay		Seminar essay	1	(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Evaluation of gained knowledge in form of two colloquiums. Maximal score is 100 points, while minimum is passing of exam is with 50 points. Exam: individual, theoretical. Mode of exam: written form.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	Grubišić, V., Domazet, Ž.: Fatigue strength of materials (in Croatian)		E-learning
	Additional course materials		E-learning
Optional literature (at the time of submission of study programme proposal)	- K. Hoffmann: An Introduction to Measurements Using Strain Gauges, Hottinger Baldwin Messtechnik GmbH, Darmstadt - M. Andrassy, I. Borbas, S. Švaić: Osnove termografije s primjenom, Kigen, Zagreb, 2008.		
Quality assurance methods that ensure the acquisition of exit competences	- Student evaluations - Registering student's attendance to course		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	**FINITE ELEMENT METHOD**		
Code	FESL10	Year of study	1.
Course teacher	Željan Lozina, Ph. D., Full Professor	Credits (ECTS)	5
Associate teachers	Damir Sedlar, Ph. D., Assistant Professor Ivan Tomac, Ph. D., Assistant Professor	Type of instruction (number of hours)	L: 30, S: 0, AE: 15, LE: 0, DE: 15
Status of the course	Obligatory	Percentage of application of e-learning	0

COURSE DESCRIPTION

Course objectives	- The aim of the course is to teach the students to be able to use Finite Element programs in a practical way to solve problems in linear elastic stress analysis. A student who has studied the course should be able, in a later industrial setting, to undertake the analysis of real problems with a fair understanding of sensible modelling procedures. - The course is also aimed at providing the necessary theoretical and practical background for more advanced studies within the field of finite elements and structural mechanics.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	1. Understand the basic theory behind the finite element method a) Strong and weak formulation b) Virtual work and variational formulation c) Basics of the approximate solution of PDE 2. Use the finite element method for the solution of practical engineering problems 3. Use a commercial FE-package 4. Analyze more advanced topics within the field of finite elements and structural mechanics.

Course content broken down in detail by weekly class schedule (syllabus)

Course content	L hours	KV+DE hours
Introduction to basic concepts: One-dimensional equation of extension of bar. Wave equation.	3	2
Direct approach: Bar, beam, truss,…	3	2
Virtual work principle.	3	2
Interpolation and approximation of functions, shape functions in one dimension.	3	2
Strong and weak formulation.	3	2
Virtual work approach to bending of bars and FEM.	3	2
Two dimensional problems: strong and weak formulation of potential problems.	3	2
First midterm exam		
Shape functions in two and three dimension.	3	2
Virtual work principle for two dimension elasticity.	3	2
CST element for two dimension elasticity.	3	2
Higher order elements in elasticity.	3	2

	Finite elements in dynamics.	3	2
	Finite elements in elastic stability.	3	2
	Second midterm exam		
	List of laboratory exercises		LE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report		Individual work	2,9
	Essay		Seminar essay		Laboratory exercises	0
	Tests	0	Oral exam		Preparation for laboratory exercises	0
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of 10 theoretical questions and numerical problems and final tests consist of 20 theoretical questions and numerical problems. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) the activities in percentage: • M1, M2 – test results. Grading according Faculty and University rules.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Ž. Lozina: Autorizirana predavanja, FESB		e-learning portal
	Ž. Lozina: Metoda konačnih elemenata, FESB, Split.	5	

Optional literature (at the time of submission of study programme proposal)	K.-J. Bathe: Finite Element Procedures, Prentice Hall Inc., 1996.
Quality assurance	- Evaluation of results in accordance with the above learning outcomes

methods that ensure the acquisition of exit competences	- Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">FLUID FLOW</td></tr>
<tr><td>Code</td><td>FESL01</td><td>Year of study</td><td colspan="6">1</td></tr>
<tr><td>Course teacher</td><td>Prof. Zoran Milas, PhD</td><td>Credits (ECTS)</td><td colspan="6">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td colspan="2">DE</td></tr>
<tr><td>2</td><td></td><td>1</td><td>1</td><td colspan="2"></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="6"></td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:

- understanding of stress-strain relationship in viscous fluids
- solving NS equation and apllying the solutions in various engineering problems .
- deepening knowledge on the boundary layers and on the effect of pressure gradient on boundary layer development.
- being familiar with the limitations of potential flow theory
-modelling the effect of tip vortices on lifting surfaces of finite span
- introduction into turbulence modelling</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">Mathematics 2, Fluid Mechanics 1,</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:

- critically apply the available analytical solutions of Navier-Stokes equation for solving engineering problems associated with viscous fluid flow
- evaluate the pressure drop in porous media and the overflow rating of settling tanks.
- understand the effect of viscosity on load-carrying capacity of bearings
- analyze the distribution of fluid pressure and shear stress around the body in parallel stream and to understand the effect of flow separation
- make use of the superposition of elementary potential flows for modelling complex flows
- use experimental data on lift-drag of slender bodies and apply correction to the force coefficients for various aspect ratios
-understand the effect of turbulence model selection
-</td></tr>
<tr><td rowspan="10">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="6">Stress in fluids, Navier equation, rotation and deformation rate in fluids</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Stokes constitutive relations, Navier-Stokes eq.</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Hagen-Poiseuill flow in circular pipe, concentric annuli, Kozeny Carman eq. for porous media.</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Couette flow, hydrodynamic lubrication.</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Stokes (sphere) flow, settling velocity.</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Boundary layer theory, friction coefficient for flat plate, Falkner Skan flow,</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Separation of boundary layer, Karman boundar layer eq.</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Solution techniques for Karman integral boundary layer eq.</td><td>2</td><td>1</td></tr>
<tr><td colspan="6">Potential flow, stream function, elementary potential flows.</td><td>2</td><td>1</td></tr>
</table>

	Kutta-Joukowsky theorem for isolated profile and for cascade of profiles. Hydrodynamic mass.	2	1
	Tip vortices, vortex sheet, effect of finite span on lift- drag coefficients.	2	1
	Introduction to turbulence modelling.	2	1
	Prandtl mixing length model. Complex turbulence models.	2	1
	List of laboratory or design exercises		LE or DE hours
	Pressure drop in capillary tube		2
	Porous media flow, fluidization		2
	Bag house air filter and sand filter (field work)		2
	Viscometry		2
	Viscous damper		2
	Airfoil drag		1,5
	Leading edge pressure distribution		1,5

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work	☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	Class room attendance min. 70 % . All required laboratory exercises and reports completed.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report		Individual work (prep. for test and exam)	2,3
	Essay		Seminar essay		Laboratory exercise reports	0,4
	Tests	0,2	Oral exam		(Other)	
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterm tests and final exams. The first midterm test takes place after 7 weeks of lecturing and the second one 6 weeks later. Each midterm test contains 2-3 numerical problems and 12 short questions (incl. multiple choice questions) and 4 essay questions Students who did not pass the midterm tests exams take part in the final exams. The midterm and final exams are carried out as written tests (closed book). The requirement for passing grade is the positive assessment of laboratory exercises/reports and 50 % points on each midterm test/ final exam and successful completion of final oral exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,1 LE + 0,4(M1 + M2) +0,1 FOE the activities in percentage: · LV – laboratory assessment, · M1, M2 – test results., FOE-final oral exam

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	- Milas Z.., Fluid Flow -authorized lectures, FESB, Split, 2015	5	

	- Virag Z., Mechanics of Fluids 2“, FSB, Zagreb	5	
Optional literature (at the time of submission of study programme proposal)	White, F. M.: Viscous Fluid Flow, McGraw Hill, New York, 2005		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	**FUEL CELLS**							
Code	FESL29	Year of study	1					
Course teacher	Frano Barbir, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Ivan Tolj, Ph. D., Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective	Percentage of application of e-learning						
COURSE DESCRIPTION								
Course objectives	Training students for: Application of fuel cell technologies and their application Designing and dimensioning fuel cells and fuel cell systems							
Course enrolment requirements and entry competences required for the course	Thermodynamcs 2							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1. Explain the principles of fuel cell operation 2. Apply a polarization curve and appropriate equations to size a fuel cell and its operating parameters 3. Design and dimension the fuel cell system components as well as the intire fuel cell system for a particular application 4. Analyze possible fuel cell applications 5. Point out the advantages of fuel cells in particulat applications							

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction to fuel cells, what is a fuel cell, types of fuel cells, principle of operation, history of development	2	2
	Thermodynamics of energy conversion in fuel cells, theoretical voltage, theoretical efficiency, effect of temperature and pressure	2	2
	Electrochemical reactions basics, electrode kinetics, Butler-Volmer equation – relationship between current density and voltage, activation polarization,voltage losses due to ionic and electronic resistance, concentration polarization	2	2
	Polarization curve of a fuel cell and what affects it: efficiency of fuel cell	2	2
	Main components of fuel cell and their characteristics; membrane, catalytic layer, gas diffusion layer, bipolar plates	2	2
	Operation of fuel cell – operational parameters: flow rate of the reactants, temperature, pressure, humidity	2	2
	Mass and energy balance, equations for molar and mass flow rates, stoichiometric ratio, equations for enthalpies,reaction heat	2	2
	Midterm exam	2	
	Fuel cell stack design, supply of reactants – flow field,	2	2

	pressure drop, heat removal, clamping		
	Testing of fuel cells and diagnostic methods	2	2
	Balance of plant, hydrogen/oxygen and hydrogen/air systems, Calculation of compression work, calculation of cooling loop, voltage regulators, system control	2	2
	Hydrogen generation from hydrocarbons; reformers; integration of reformers with fuel cell	2	2
	Applications of fuel cells: in vehicles, stationary generation, heat and power cogeneration, small fuel cells for battery replacement s	2	2
	Hydrogen as fuel; hydrogen energy system	2	2
	II Midterm – presentations of seminars	2	
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
Class attendance	2	Research		Practical training	
Experimental work		Report		Independent study	1.5
Essay		Seminar essay	1	(Other)	
Tests	0.5	Oral exam		(Other)	
Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. First midterm test consists of theoretical questions and numerical problems. Passing grade is at least 50% of the maximum number of points. The second midterm is a seminar on a given topic and its presentation. The first and the second final exam is for the students that did not pass either of the midterms. At the last final exam and the committee exam the students are asked both parts. Grade (in percentage) is formed according to the formula: Grade(%) = (M1 + M2)/2 where: • M1, M2 – points from the midterm. The final grade is determined based on the grade (%) in the following manner: 50% to 61% sufficientn (2), from 62% to 74% good (3), from 75% to 87% very sgood (4), from 88% to 100% excellent (5). In accordance with the Article 71 of the Faculty Statute the student is required to

<table>
<tr><td></td><td colspan="3">participate in all the lectures and excercises with at least 70% attendance. The students who does not meet this requirement will not be allowed to take the midterm tests or the exams.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>F. Barbir: PEM fuel Cells Theory and Practice, Elsevier/Academic Press, 2. edition, 2013</td><td></td><td>e-learning portal</td></tr>
<tr><td>Powerpoint presentations</td><td></td><td>e-learning portal</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">- J. Larminie and A. Dicks, "Fuel Cell Systems Explained", J. Wiley, 2nd ed. 2003
- R. O'Hayre, et al., "Fuel Cell Fundamentals", J. Wiley, 2nd ed. 2009</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Attendance track record
- Periodic quizzes with multiple choice questions
- Annual evaluation of the exam success rate
- Feedback from students via surveys
- Self-evaluation of teachers</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3">Lectures are in English</td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">HEAT AND MASS TRANSFER</td></tr>
<tr><td>Code</td><td>FESL12</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Frano Barbir, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Dario Bezmalinović, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- Recognizing mechanisms of heat and mass transfer
- Analytical and numerical approaches for solving heat transfer problems
- Modeling and analyzing heat and mass transfer processes</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Thermodynamics 2</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Recognize and distinguish the basic mechanisms of heat transfer
- Apply analytical and numerical methods on different cases of heat and mass transfer
- Choose appropriate equations for calculating the heat transfer coefficient for different cases of heat transfer
- Break down and solve different cases of heat and mass transfer
- Analyze the heat transfer during evaporation processes
- Calculate basic characteristics of cooling towers</td></tr>
<tr><td rowspan="8">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">The course introduction. Calculation of heat transfer and temperature field for solid bodies. The control volume method (CVM) in one-dimensional steady state heat conduction.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Two-dimensional steady state heat conduction, control volumes and methods for solving a system of equations. Relaxation (iterative) method for solving a system of equations.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Examples and overview of the equations.
One-dimensional transient conduction – the explicit variation of the CVM.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Criteria of stability of solutions. Examples of the CVM application for solving multi-dimensional problems</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Examples and overview of the equations. The implicit variation of the CVM. Examples and comparison with the explicit variation. Accuracy of the CVM.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Fundamentals of the convection. Mechanisms of heat transfer for laminar flow.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Thickness of the velocity boundary layer for a flat plate.</td><td>2</td><td>2</td></tr>
</table>

	Thickness of the temperature boundary layer for a flat plate. The heat transfer coefficient		
	First midterm exam	2	2
	Link between the boundary layer and the Prandtl number for laminar flow. Laminar flow in pipes. Energy balance, its integral and the Nusselt number for laminar flow in pipes	2	2
	Mechanism of turbulent flow. The Reynolds analogy. Thickness of a turbulent boundary layer for a flat plate.	2	2
	Thickness of a turbulent boundary layer for a flat plate. Heat transfer coefficient for turbulent flow over a flat plate and through a pipe.	2	2
	Heat phenomena during an evaporation process, energy balance, simultaneous heat and mass transfer in cooling towers	2	2
	Characterization of simultaneous heat and mass transfer in diagram. Link between cross flows and co-flows of heat and mass. The Sherwood diagram.	2	2
	Demanded characteristics and physical characteristics of a cooling tower. Thermodynamic limits in heat transfer	2	2
	Second midterm exam	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	To attend at least 70% of all the lectures and exercises	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	2,5
	Essay		Seminar essay		(Other)	
	Tests	0,5	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at	During the semester there are two midterm exams. The students that do not pass the midterm exams (or are not happy with their grades) have two final exam opportunities at the end of the semester and additional two opportunities at the end

<table>
<tr><td>the final exam</td><td colspan="3">of the academic year on pre-decided dates. The first midterm exam takes place after the first 7 weeks of lecturing, while the second midterm exam takes place in after additional 6 weeks of lecturing. All the exams are carried out as written tests. The requirement for a passing grade is >49% points. On the first two final exams (at the end of the semester), the students are required to pass only the part which they failed to pass on the midterm exams. On the second two final exams (at the end of the academic year), the students are required to pass the whole exam, regardless of their success on the midterm exams.

The final average percentage is calculated as follows:

Points (%) = (M1+M2)/2;
where M1 and M2 are percentage points of the first and second midterm test, respectively.

The final grade depends on the final percentage and is calculated as follows:
50% to 61% - fair (2),
62% to 74% - good (3),
75% to 87% - very good (4) and
88% to 100% - excellent (5)

According to the Article 71 of the Faculty Statute, students are required to attend all forms of lectures and exercises by at least 70%. Students who fail to comply with this regulation will not be allowed to take the exams.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>F. Barbir: Uvod u prijenos topline i tvari, interna skripta, FESB, 2014.</td><td></td><td>e-learning portal</td></tr>
<tr><td>N. Ninić, Elementi prijenosa topline, FESB 2002</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. J.P. Holman, Heat Transfer, 8th ed., McGraw Hill, New York, 1997.
2. E. Ganić, Prijenos toplote, mase i količine kretanja, Svijetlost, Sarajevo 2005.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Monitoring of students attendance during lectures and exams
- Annual analysis of the average exam success
- Feedback from students via surveys
- Self-evaluation of teachers</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

NAME OF THE COURSE	**HEAT TREATMENT AND SURFACE PROTECTION**							
Code	FETL10	Year of study	1					
Course teachers	Dražen Živković, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Zvonimir Dadić, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	10	0	20	0	
Status of the course	Elective	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	Provide an overview and explanation: - Basic damaging processes of the metal surface layers, - Basic principles of surface heat treatment, - Chemical diffusion surface treatment and protective coatings, - Basic methods of surface protection		
Course enrolment requirements and entry competences required for the course	Basic knowledge about structure and properties of materials. Passed exams: Materials 1 and 2. In order to be able to follow news within this area students have to be fluent in technical English reading.		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Classify the types of surface damage, - Analyse the appearance of damaged surfaces, - Estimate the necessary surface protection methods, - Characterize the processes of heat treatment steel surface layers, - Propose the heat treatment to reduce surface wear, - Featured necessary parameters for successful heat treatment, - Select a method for surfaces protection		
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	The purpose of the heat treatment, protection during heat treatment	2	0
	Heat treatment, hardening	2	0
	Tempering (classic and isothermal) - Structural changes and properties	2	0
	Low tempering of steel (purpose, microstructure)	2	0
	Chemical - diffusion processes of heat treatment, cementing	2	0
	Nitriding, Carbonitriding, Boronizing	2	0
	CVD and PVD methods	2	0
	First midterm exam		
	Heat treatment of ferrous cast	2	0
	Heat treatment of tool steels	2	0
	Mechanical surface hardening methods (shot peening hammering, needling)	2	0
	Corrosion, types of corrosion processes, corrosion affinity	2	0
	Chemical corrosion, electro-chemical corrosion, marine corrosion	2	0
	Basic principles of corrosion protection	2	0
	Second midterm exam		
	List of laboratory		LE hours
	The selection of austenitizing hardening temperature		2
	The coolant influence on the hardness after quenching		2

<table>
<tr><td rowspan="6"></td><td colspan="2">Classical tempering - structural changes, properties</td><td>2</td></tr>
<tr><td colspan="2">The tempering temperature effect on the structure and properties of ADI</td><td>2</td></tr>
<tr><td colspan="2">The heating temperature effect of on the Jominy curve (Part I)</td><td>2</td></tr>
<tr><td colspan="2">The heating temperature effect of on the Jominy curve (Part II)</td><td>2</td></tr>
<tr><td colspan="2">Heat treatment of tool steel</td><td>2</td></tr>
<tr><td colspan="3">First midterm exam</td></tr>
<tr><td rowspan="4"></td><td colspan="2">Heat treatment of Al alloys (structure, properties)</td><td>2</td></tr>
<tr><td colspan="2">Marine corrosion of Al alloys (types and protection)</td><td>2</td></tr>
<tr><td colspan="2">hoot peening</td><td>2</td></tr>
<tr><td colspan="3">Second midterm exam</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="2">☐ independent assignments
☒ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1,0</td><td>Research</td><td></td><td>Laboratory exercises</td><td>0,7</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Self-directed learning</td><td>3,0</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0,3</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester there will be two mid-term exams (tests). The first mid-term, after 7 weeks of classes and the second after the next 6 weeks of classes. At the final exam students have to take part material that did not pass the mid-term. Each test is carried out as written exam lasting 45 minutes. Usually it consists of the three tasks. The requirements for a positive evaluation are: positive assessment of laboratory exercises and seminar, 50% points on each test. The final grade is based on the resulting percentage on mid-term exams.

Percentage - Rating
50% to 61% - sufficient (2)
62% to 74% - good (3)
75% to 87% - very good (4)
88% to 100% - excellent (5)
Examinations according to the Faculty schedule!

The final grade is determined after the second final exam, applying the absolute ECTS grading system in accordance with the study rules and study system of the University of Split. Students who did not pass the exam after two final exams have the last chance to pass exam in the autumn period. Overall material has to be passed at last possible exam. The written exam consists of six tasks. The exam lasts 90 minutes.</td></tr>
</table>

<table>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>D. Živković, authorized lectures, FESB</td><td></td><td>E-learning portal</td></tr>
<tr><td>R. Deželić, Metali 2, FESB Split, 1998.</td><td>10</td><td></td></tr>
<tr><td>F. Kovačiček, Đ. Španiček, Materijali – osnove</td><td>2</td><td></td></tr>
</table>

	znanosti o materijaliam, FSB Zagreb, 2000.		
	M. Stupnišek, F.Cajner: Osnove toplinske obrade metala, Sveučilište u zagrebu, FSB, 1996.	5	
Optional literature (at the time of submission of study programme proposal)	G.E. Totten, Steal heat treatment – metallurgy and technologies, Portland, Oregon, USA, 2006		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	**HEATING AND AIR CONDITIONING**							
Code	FESL23	Year of study	1					
Course teacher	Nižetić Sandro, Ph. D., Associate Professor	Credits (ECTS)	5					
Associate teachers	Ivan Tolj, Ph. D., Teaching assistant Dario Bezmalinović, Ph. D., Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective.	Percentage of application of e-learning						
COURSE DESCRIPTION								
Course objectives	Training students for: - Categorization and description of the HVAC systems, - Compute and general design of the elements inside the HVAC systems according to standards.							
Course enrolment requirements and entry competences required for the course	Thermodynamics 1, Mathematics 1, Mathematics 2.							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Consider base terms and issues related to the thermal comfort, - Analyse and compute heat losses and gains according to the standards, - Compare fuels in the HVAC systems, i.e. heating and cooling applications and elaborate their impact to the environment, - Consider and compute base components of the heating/cooling, i.e. HVAC systems, - Consider and compute ventilation systems.							

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction and basic terms (issues) related to the thermal comfort. External and internal design temperatures. Climate conditions.	2 hours	2 hours
	Calculation of the heat losses.	2 hours	2 hours
	Calculation of the heat losses.	2 hours	2 hours
	Heating elements, characteristics, correction of the nominal thermal load.	2 hours	2 hours
	Central heating systems, calculation of the carbon dioxide emissions.	2 hours	2 hours
	Calculation and design of the pipelines in the heating systems.	2 hours	2 hours
	Boilers, types, classification, boiler rooms.	2 hours	2 hours
	Other equipment of the heating systems.	2 hours	2 hours
	Preparation of the hot water and calculation of the heating	2 hours	2 hours

	demands.		
	Regulation of the heating systems.	2 hours	2 hours
	Calculation of the heat gain.	2 hours	2 hours
	Fan coil devices, other cooling elements.	2 hours	2 hours
	Central water based air-conditioning systems, climate chambers, coolants (refrigerants)	2 hours	2 hours
	Ventilation systems, components, calculation of the required airflow for ventilation purpose.	2 hours	2 hours
	Heat pumps, absorption cooling devices.	2 hours	2 hours
	List of laboratory or design exercises		LE or DE hours
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)	
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required auditorium exercises.		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research	2	Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project	1	(Other)	
Grading and evaluating student work in class and at the final exam						

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Nižetić, Online predavanja Grijanje i Klimatizacija dio I i dio II, 2011, FESB.		
	Recknagel, Sprenger, Schramek, Čeperković: Grijanje i klimatizacija 2005, Energetika marketing, Zagreb, 2005 (Prijevod sa njemačkog)		

	ASHRAE Handbooks: Fundamentals, Applications, Systems and Equipment, Refrigeration, ASHRAE, Atlanta, USA, 2001, 2002, 2003, 2004		
	Priručnik za Ventilaciju I klimatizaciju, EGE, 2003.		
	Priručnik za grijanje, EGE, 2005		
Optional literature (at the time of submission of study programme proposal)	Časopis: EGE, Energetika marketing, Zagreb Časopis: ASHRAE Journal, ASHRAE, Atlanta, USA		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	**HYBRID ENERGY SYSTEMS**							
Code	FESL39	Year of study	1.					
Course teacher	Branko Klarin, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Goran Gašparović, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	Training students for: - specify the most important widely accepted renewable energy sources, - enumerate and explain the modes of renewable energy converter application, - categorize and create hybrid energy system for a specific application, due to the availability of resources and usage.		
Course enrolment requirements and entry competences required for the course			
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - explain the role of wind, solar, biomass and other relevant renewable energy sources, - to interpret the role of hybrid energy systems in energy supply, - explain ways of storing energy, - analyze and compare the energy potential of mobile, fixed systems, - critically review the effects on the production and application of hybrid power systems, - identify and assess trends in the future implementation of such systems.		
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction and importance of hybrid energy systems.	2	2
	Solar energy, biomass, geothermal and hydropower.	2	2
	Wind energy and wind potential.	2	2
	Narrower and broader concept of hybrid systems for the conversion of energy from renewable sources. Basic division and basic parts.	2	2
	The role of the hybrid system in the energy supply and the target group of consumers.	2	2
	Basic knowledge of hybrid and micro-networks, individual systems and centralized energy systems and the electricity network.	2	2
	Availability and transport of energy, the use of multiple types of energy in one place.	2	2
	Storing energy in hybrid energy systems.	2	2
	Movable and fixed objects powered by hybrid energy systems and specificities.	2	2
	Energy resources for mobile and fixed objects, differences and simplifications.	2	2
	Energy needs, potentials and dimensioning.	2	2
	Examples of available and dominant sources.	2	2
	Sustainability and perspectives of application.	2	2
	List of laboratory or design exercises		LE or DE hours

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<tr><td rowspan="4"></td><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td colspan="5"></td><td></td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☐ independent assignments
☒ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>3,5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1,5</td><td>Laboratory exercises</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of seminar essay progress. In the final exams students that did not pass the midterm exams take part. The final exams are carried out as finished seminar essay acceptance. The requirement for passing grade is the positive grade of seminar essay. Grade (in percentage) is formed according to the formula:
Grade(%) = 0,5 (M1 + M2)
where in percentage:
• M1, M2 – seminar essay status.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">- Klarin B.: Hibridni energetski sustavi, authorized lectures, FESB</td><td></td><td>e-learning portal</td></tr>
<tr><td colspan="4">- Kulišić, P., Novi izvori energije, Školska knjiga, Zagreb, 1991.</td><td></td><td>book</td></tr>
<tr><td colspan="4">- Kulišić, P.; Vuletin, J.; Zulim, I.: Sunčane ćelije, Školska knjiga, Zagreb, 1994.</td><td></td><td>book</td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- Masters, G.M.: Renewable and Efficient Electric Power Systems, Wiley-IEEE Press, 2004.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6">- Feedback from graduate students about the course relevance</td></tr>
</table>

NAME OF THE COURSE	HYDRAULIC AND PNEUMATIC SYSTEMS						
Code	FETL17	Year of study	1				
Course teacher	Jani Barle, Ph. D., Full Professor	Credits (ECTS)	5				
Associate teachers	Alen Kovač, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	CE
			30	0	0	15	15
Status of the course	Elective	Percentage of application of e-learning	0				

COURSE DESCRIPTION	
Course objectives	Upon completion the student will be introduced to essential features of industrial hydraulic or pneumatic systems. They will be able to draw, explain and assemble schematic diagram and to demonstrate ability to identify hydraulic or pneumatic system elements by symbol and function and to use that skills for fault finding and solving.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1. Present general concepts associated with industrial appliaction of hydraulics and pneumatics. 2. Identify components of the system and draw related symbols. 3. Arrange and assemble simple hydraulic and pneumatic systems. 4. Combine various elements with respect to size and design concept. 5. Critically assess workability and supportability of complex hydraulic and pneumatic systems. 6. Develop hydraulic or pneumatic system.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	LE hours	CE hours
	Historical aspect and scope of hydraulics and pneumatics. Introduction to pneumatics. Basic physical principles of pneumatics.	2		
	Typical pneumatic systems demonstrations.		2	
	Compressed air generation and distribution. Standards and Symbols.	2		
	Compressed air generation and distribution.			2
	Basic elements of pneumatic systems (check, pressure control and directional control valves).	2		
	Methods for development of pneumatic systems.			2
	Basic elements of pneumatic systems (directional control valves, valve actuation types, accessories).	2		
	More complex pneumatic circuits (introduction to laboratory exercises).			2
	Basic elements of pneumatic systems (cylinders and motors).	2		
	Circuit assembling on pneumatic didactic table (guided).		2	
	Electric valves and electropneumatic systems. Proportional pneumatics.	2		
	Circuit assembling on pneumatic didactic table.		2	
	Introduction to hydraulics. Basic physical principles of hydraulics, oils and theoretical background. Energy efficiency of hydraulic systems. Fundamental hydraulic problems:	2		

	cleanness, temperature, cavitation - bubble entrainment and evacuation.			
	Typical hydraulic systems demonstrations.		2	
	Hydraulic elements for energy conversion: cylinders, pumps and motors with constant and adjustable displacement.	2		
	Hydraulic elements and their most important parts.		2	
	Basic control elements in hydraulics: check valves, direct acting and pilot operated pressure-relief valves.	2		
	Hydraulic elements and their most important parts.		2	
	Basic control elements in hydraulics: direct acting and pilot operated directional control valves, pressure regulators, flow control valves.	2		
	Hydraulic cylinders - parallel and series circuit. Synchronizing cylinder movement and load.			2
	Typical design solutions of hydraulic elements for energy conversion (cylinders, pumps and motors with constant and adjustable displacement)	2		
	Typical hydraulic circuits: accumulator holding, pump unloading, braking, counter balance. Hydraulic presses.			2
	Pressure control circuits. Flow and speed control circuits.	2		
	Flow control circuits (introduction to laboratory exercises).			2
	Closed flow hydraulic circuits. Load sensing (LS) systems.	2		
	Hydraulic didactic model. Motor speed adjustment with throttle valve. Speed control with two and three-way flow control valves.		2	

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ individual assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ individual project (other)

Student responsibilities	Minimum of 70 percent lecture attendance. Completing all the required laboratory exercises.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report		Individual work	2,0
	Essay		Seminar essay		Preparation for exercises	0,8
	Tests	0,2	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam

There are two midterms and final exams. The first midterm exam is after 7-week session classes and the second one is after the next 6 weeks. The midterms are carried out as written tests, made up of three questions relating to the basic issues and schematics. The oral exam is focused on the student's interpretation skills. The requirement for passing grade is the positive assessment on each midterm exam (>49%) or the final exam.
The final score is:

$$Score\ (\%) = 0{,}35 \times A_1 + 0{,}35 \times A_2 + 0{,}20 \times A_3 + 0{,}10 \times A_4$$

- *midterm 1: A_1 = 50 – 100 %,*
- *midterm 2: A_2 = 50 – 100 %,*
- *oral exam: A_3 = 50 – 100 %.*
- *class attendance: A_4 = 70 – 100 %.*

<table>
<tr><td></td><td colspan="3">Score Grade
50% - 62% sufficient (2)
63% - 76% good (3)
77% - 88% very good (4)
89% - 100% excellent (5)</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Barle, J.: Hydraulics and pneumatics, (student handbook and workbook in Croatian: Hidraulika i pneumatika), FESB, Split, 2010.</td><td></td><td>e-learning portal</td></tr>
<tr><td>Nikolić, G.: Pneumatika, Školske novine, Zagreb, 1994.</td><td></td><td></td></tr>
<tr><td>Koroman, V.; Mirković, R.: Hidraulika i pneumatika, Školska knjiga, Zagreb, 1991.</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">Lang, R.A. (ed.): Hydraulic Trainer 1; Planning and Design of Hydraulic Power Systems, Mannesmann Rexroth AG, 1998.
Rabie, M.: Fluid Power Engineering, McGraw-Hill, 2009.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

NAME OF THE COURSE	INDUSTRIAL ELECTRONICS						
Code	FELL02	Year of study	2				
Course teacher	Tihomir Betti, Ph. D., Assistant Professor	Credits (ECTS)	5				
Associate teachers	Ivan Marasović, Ph. D., Assistant Professor	Type of instruction (number of hours)	L	S	AE	LE	DE
			30	0	0	30	0
Status of the course	Elective	Percentage of application of e-learning					

COURSE DESCRIPTION	
Course objectives	Training students for: - Analysis of amplifier circuits using adequate transistor models. - Analysis of basic operational amplifier circuits. - Understanding circuits for pulse waveform generation. - Understanding operating principle of basic pulse and digital circuits.
Course enrolment requirements and entry competences required for the course	None.
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Name the main properties of semiconductor materials. - Explain the operating principle of basic electronic devices. - Apply transistor models for calculating basic amplifier parameters. - Describe frequency response of an amplifier. - Explain the operating principle of simple circuits with operational amplifier. - Calculate and sketch waveform response of RC circuits. - Describe the structure and explain the operating principle of bistable, monostable and astable circuits. - Explain the operating principle of logic circuits. - Test the operation of elementary circuits in the laboratory.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours
	Introduction. Semiconductor materials. Energy bands in semiconductors. Intrinsic and extrinsic semiconductors.	2
	Carrier transport phenomena: diffusion and drift transport. Carrier mobilities. Einstein relation. PN-junction. Current-voltage characteristic of a diode.	2
	Bipolar junction transistors (BJT): structure and technology. Transistor operation in the active mode. Transistor parameters. BJT modes of operation.	2
	Unipolar transistors (FETs). Types of unipolar transistors. JFET and MOSFET: operation, dynamic parameters and static characteristics.	2
	Introduction to electronic amplifiers. Amplification (relative and in decibels). Types of electronic amplifiers. Amplifiers analysis at DC conditions.	2
	Amplifier analysis at small-signal AC conditions.	2
	Thyristors, power MOSFETs, IGBT.	2
	Linear waveshaping: RC circuits for differentiation and integration. Attenuators.	2
	Operating amplifiers: definition and basic properties. Examples of operational amplifier applications.	2
	Non-linear waveshaping: clipping and clamping circuits.	2

	Multivibrators. Bistable circuit at DC, bistable switching. Monostable. Astable. Astable and monostable realized with operational amplifier. Schmitt trigger.	2
	Logic circuits. Basic logic circuits. Advanced logic circuits: DTL; TTL, CMOS technology.	2
	Analog-to-digital conversion circuits. DC-DC switching voltage converters.	2
	List of laboratory or design exercises	LE hours
	Semiconductor diode. Light-emitting diode (LED). Zener diode.	3
	Bipolar junction transistor at DC.	3
	JFET at DC conditions.	3
	Common-emitter and common-collector amplifiers.	3
	Common source amplifier. Operational amplifier.	3
	Waveform generation.	3
	Differentiator and integrator circuits.	3
	Clipping and clamping circuits.	3
	Schmitt trigger.	3
	Multivibrators.	3

Format of instruction	☒ lectures ☐ seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	At least 70% of lectures attendance. Completed all laboratory assignments and the presentation of two projects.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay		Laboratory exercises	1
	Tests	0.15	Oral exam			
	Written exam	0.1	Project	0.75	(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterm exams (the first after 7 weeks of classes, the second after the following 6 weeks of classes) and final exams. Students that do not pass both midterm exams take part in the final exam. Midterm and final exams are written and last for 90 minutes. The requirement for passing the course is to complete all laboratory work, as well as final project. The final grade (in percentage) is formed using following formula: Grade(%)=0.3(M1+M2)+0.4L, where: • M1, M2 – grade from midterm exams given in percentage, • P – grade from project given in percentage.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	T. Betti, I. Marasović: Elektronički elementi i sklopovi – autorizirana predavanja (PowerPoint)		E-learning portal
	P. Slapničar: Impulsna i digitalna tehnika, FESB, Split, 2001.		
	P. Slapničar, S. Gotovac: Elektronički sklopovi,		

	FESB, Split, 1999.		
	S. Bovan, I. Marasović: Elektronički elementi i sklopovi – Upute za laboratorijske vježbe, FESB, Split, autorizirana skripta		
Optional literature (at the time of submission of study programme proposal)	- P. Biljanović: Poluvodički elektronički elementi, Školska knjiga, Zagreb - J. Millman, A. Grabel: Microelectronics, McGraw-Hill		
Quality assurance methods that ensure the acquisition of exit competences	- Record of number of students attending the classes - Evaluation of results in accordance with expected learning outcomes - Feedback from students via student surveys - Teachers self-evaluation - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	INTRODUCTION TO FRACTURE MECHANICS							
Code	FESL18	Year of study	1					
Course teacher	Srdjan Podrug, Ph.D., Associate Professor	Credits (ECTS)	5					
Associate teachers		Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	To provide an understanding of the various aspects involved in fracture mechanics.		
Course enrolment requirements and entry competences required for the course	None		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Define basic parameters of the linear-elastic fracture mechanics. - Determine the values of the basic parameters of linear-elastic fracture mechanics. - Determine the direction of crack propagation. - Define the fatigue crack growth rate using Paris law.		
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Fracture mechanics history and overview.	4	
	Stresses and strains around crack tip.	2	
	Linear-elastic fracture mechanics.	2	
	Strain energy release rate.	2	4
	Stress intensity factor.	2	2
	Relationship between strain energy release rate and stress intensity factor.	2	6
	Computation methods of stress intensity factors: displacement correlation technique, modified crack closure integral technique, J-integral technique.	4	4
	Crack growth directions. Maximum tangential stress criterion, minimum strain energy density criterion, maximum energy release rate criterion,	4	4
	Crack growth rate. Paris law	4	6
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)	
Student responsibilities	Course attendance and activity (lectures, exercises), studying.		

Screening student work *(name the proportion of ECTS credits for each activity so that the*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	3
	Essay		Seminar essay		(Other)	

<table>
<tr><td rowspan="2">total number of ECTS credits is equal to the ECTS value of the course)</td><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester, there will be two mid-term exams (tests). The first mid-term, after 7 weeks of classes, and the second after 13 weeks of classes. In the final exams students that did not pass the midterm exams take part.
Grade (%) = 0,5M1 + 0,5M2
M1 - points of first mid-term exam expressed in percentage, this mid-term exam consists of theoretical questions and numerical tasks.
M2 - points of second mid-term exam expressed in percentage, this mid-term exam consists of theoretical questions and numerical tasks.
The requirement for a positive evaluation is the positive assessment of the first mid-term M1 >= 45%, and the second mid-term M2 >= 45%.
The final grade is determined as follows:
Percentage - Rating
50% to 61% - Sufficient (2)
62% to 74% - Good (3)
75% to 87% - Very good (4)
88% 100% - Excellent (5)
Students who do not get positive evaluation through mid-term exams take written numerical and theoretical exam.</td></tr>
<tr><td rowspan="2">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Podrug, S.: Fracture mechanics – course materials (in Croatian)</td><td></td><td>e-learning portal</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- Anderson, T.L.: Fracture Mechanics – Second edition, CRC Press, 1995.
- Sanford R.J.: Principles of Fracture Mechanics, Prentice Hall, 2003.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Evaluation of results in accordance with the above learning outcomes.
- Feedback from students via surveys.
- Self-evaluation of teacher.
- Institutional and non-institutional evaluations.</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">INTRODUCTION TO INFORMATION SYSTEMS</td></tr>
<tr><td>Code</td><td>FESE06</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Damir Vučina, Ph. D. Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Igor Pehnec, Ph. D. Teaching assistant
Ivo Marinić- Kragić, Teaching assistant
Milan Ćurković, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Capability of applying computers in building information systems.
Acquiring knowledge and application skills: HTML, basic terms in databases, basics of SQL, script languages, active web pages, IS</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Completed pre-graduate studies which include courses equivalent to Computer-aided analysis. Competences in basic engineering analysis methods and program development in MATLAB</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">After completing the course, students will be able to:
• Describe information systems, specify architecture and functionality, elements, technologies
• Develop sets of HTML files for the IS
• Develop simple client scripts in Vbscript
• Create simple databases
• Develop simple SQL queries
• Build simple dynamic web pages using ASP</td></tr>
<tr><td rowspan="18">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction. systems, business processes, information processing</td><td>2</td><td></td></tr>
<tr><td colspan="5">Information systems IS, MIS, elements of IS</td><td>2</td><td></td></tr>
<tr><td colspan="5">Information systems IS, functional specifications of IS, architecture of IS</td><td>2</td><td></td></tr>
<tr><td colspan="5">Infrastructure and devices for the IS, protocols</td><td>2</td><td></td></tr>
<tr><td colspan="5">Internet, services, www</td><td>2</td><td></td></tr>
<tr><td colspan="5">Development of content for the web</td><td>2</td><td></td></tr>
<tr><td colspan="5">Basics of HTML</td><td>2</td><td></td></tr>
<tr><td colspan="5">Basics of programming, basic elements of programs</td><td>2</td><td></td></tr>
<tr><td colspan="5">Script languages, Vbscript</td><td>2</td><td></td></tr>
<tr><td colspan="5">Databases: basic terms and elements of design</td><td>2</td><td></td></tr>
<tr><td colspan="5">First midterm exam</td><td></td><td></td></tr>
<tr><td colspan="5">Databases: basics of SQL, IS and databases</td><td>2</td><td></td></tr>
<tr><td colspan="5">Simple active pages, ASP. Basic concepts of web applications</td><td>2</td><td></td></tr>
<tr><td colspan="5">Integration of IS elements</td><td>2</td><td></td></tr>
<tr><td colspan="5">Second midterm exam</td><td></td><td></td></tr>
<tr><td colspan="6">List of laboratory exercises</td><td>LE hours</td></tr>
</table>

	Information systems IS modeling, functional specifications of IS	1
	Develop sets of HTML files for the IS	2
	Scripting and Vbscript examples	2
	Databases, modelling, normalization	2
	SQL	2
	Active pages, ASP, applications	2
	Integration of IS	2

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	3	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay		Laboratory exercises	
	Tests		Oral exam		Preparation for laboratory exercises	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of respective theoretical questions and numerical problems. The final tests consist of overall theoretical questions and numerical problems. In the final exams, students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is the positive assessment of laboratory exercises and 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) the activities in percentage: • M1, M2 – test results.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	D. Vučina, M. Šušnjar, M. Uvodić 'Uvod u informacijske sustave', internal material		
	Steven Alter, 'Information Systems: Foundation of E-Business		
	Ch J. A. O'Brien, 'Management Information Systems', Irwin Inc.		
	Online skripts: w3schools - 'HTML', 'VBScript', 'ASP', 'SQL'		

Optional literature (at the time of submission of study programme proposal)	• NCSA, 'A Beginner's Guide to HTML', ili ' • HTML - An Interactive Tutorial for Beginners' • MS VBScript Tuturial • MS ASP pages R. Leinecker, 'Using ASP.net', Que, 2002
Quality assurance	- Evaluation of results in accordance with the above learning outcomes

methods that ensure the acquisition of exit competences	- Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**MACHINE TOOLS**						
Code	FETL18	Year of study	1				
Course teacher	Dražen Bajić, Ph. D., Full Professor Sonja Jozić, Ph. D., Assistant Professor	Credits (ECTS)	5				
Associate teachers	Mario Veić, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE
			45	0	0	15	0
Status of the course	Obligatory	Percentage of application of e-learning	0				

COURSE DESCRIPTION

Course objectives	Training students for: - understanding of basic machine tool parts, types of machine tools and their possible application. - acquisition of knowledge about the modular construction of modern numerically controlled machine tools.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - present the principles of operation and application of machine tools - characterize features of machine tools - categorize features of mechanisms and systems management machine tools - examine the exploitation characteristics of machine tools - identify motives of high speed and multi-operation machine tools development - designing of driving systems and mechanism in machine tools according to machine tool construction.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction to machine tools. State of the art and machine tools development. Classification of machine tools.	3	
	Basics of construction machine tools. Testing of machine tools accuracy.	3	
	Main parts of machine tools. Bearing elements, guides, spindle bearings.	3	
	Driving system of machine tools.	3	
	Machine tools control system.	3	
	Turning machines: Classification and basic concepts	3	
	Milling machines: Classification and basic concepts	3	
	First midterm exam		
	Machine tools for drilling, broaching, sawing, grinding. Machines for gear wheels manufacturing.	3	
	Technical calculations related to the machine as the whole unit and its particular parts.	3	
	Automatic tool change. Automatic workpiece change.	3	
	Machine tools for high performance machining operation. Machining center. Turning center. Grinding center.	3	
	High Speed machine tools. Parallel kinematics for machine tools	3	
	Basic concept of CNC programming. CAD/CAM introduction	3	

	Second midterm exam					
	List of laboratory or design exercises					LE or DE hours
	Movement, typical parts and mechanisms of machine tools installed in the laboratory. Determination of degree of machine tool workspace efficency.					2
	Determination of gearbox efficiency on drilling machine.					2
	Testing of geometric accuracy lathes and drills. Influence of machine tool on the machining accuracy.					2
	Rigidity of the system machine-tool-woorkpiece.					2
	Determination of gearbox efficiency on turning machine.					2
	Zero point of the workpiece and zero point of the tool at vertical machining center.					2
	Automatic CNC programming. Preparation and model production using 3D printer.					2
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work			☒ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)		
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work	0.5	Report		Reports from the laboratory exercises	0.25
	Essay		Seminar essay		(Other)	2.25
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. In the makeup exam students take the entire exam. The midterm, final and makeup exams are carried out as written tests. The requirements for passing grade is: 3. Positive assessment of laboratory exercises 4. 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) M1, M2 – test results of first and second midterm exam. Final grade is determined according to: Percentage Grade 50% do 61% sufficient (2) 62% do 74% good (3) 75% do 87% very good (4) 88% do 100% excellent (5)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Ekinović S., "Alatne mašine", Mašinski fakultet,		

	Zenica, 2004.		
	Lopez de Lacalle, Lamikiz "Machine tools for high performance machining", Springer, 2008.		
	Bajić, D., Jozić, S., Predavanja objavljena na eLearning portalu, 2015.		eLearning portal
Optional literature (at the time of submission of study programme proposal)	Cebalo, R., "Alatni strojevi – Odabrana poglavlja", Vlastito izdanje, Zagreb, 2001. - Pahole, I., Balič, J., "Obdelovalni stroji", Univerza v Mariboru, Maribor 2003.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">MANUFACTURING PROCESS PLANNING</td></tr>
<tr><td>Code</td><td>FETL25</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td>Course teacher</td><td>Nikola Gjeldum, Ph. D., Assistant Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marina Crnjac, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>45</td><td>0</td><td>0</td><td>0</td><td>15</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students to:
- select raw material and machine tools for specific production batch
- design optimal manufacturing process
- know how to measure, sort and analyze process times in manufacturing process
- identify losses at work</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- analyze product design for manufacturing process design purposes
- select optimal size and shape of raw material
- determine type of production in relation to batch size
- determine elements of process times for batch production
- suggest contemporary manufacturing process and its ability
- test objectivity and accuracy of time measurement personnel
- detect cyclical, periodical and random production steps
- reveal losses at work</td></tr>
<tr><td rowspan="19">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L hours</td></tr>
<tr><td colspan="6">Definition of production system, production and manufacturing process. Fundamentals of material flow design in the production process.</td><td>2</td></tr>
<tr><td colspan="6">The basic elements of manufacturing processes: process, composed and group process steps, process step.</td><td>1</td></tr>
<tr><td colspan="6">Definition of technology and technique. Cutting technologies.</td><td>3</td></tr>
<tr><td colspan="6">Characteristics and levels of technologies and manufacturing processes. Manufacturing process capability.</td><td>2</td></tr>
<tr><td colspan="6">The basic principles of manufacturing process design.</td><td>3</td></tr>
<tr><td colspan="6">The selection of raw material.</td><td>2</td></tr>
<tr><td colspan="6">Optimal sequence of manufacturing processes and process steps.</td><td>3</td></tr>
<tr><td colspan="6">Factors influencing on errors in manufacturing processes.</td><td>2</td></tr>
<tr><td colspan="6">Selection of manufacturing baselines.</td><td>2</td></tr>
<tr><td colspan="6">First midterm exam</td><td>2</td></tr>
<tr><td colspan="6">Group technology.</td><td>2</td></tr>
<tr><td colspan="6">Basics of Work and Time Study in production enterprise.</td><td>2</td></tr>
<tr><td colspan="6">The scale of business success in the enterprise.</td><td>1</td></tr>
<tr><td colspan="6">Time standard. Components of working time.</td><td>2</td></tr>
<tr><td colspan="6">Methods for determining the production (working) time.</td><td>6</td></tr>
<tr><td colspan="6">Performance rating.</td><td>1</td></tr>
<tr><td colspan="6">The work of a worker on multiple machines.</td><td>2</td></tr>
<tr><td colspan="6">Types and analysis of losses during the work.</td><td>1</td></tr>
</table>

	Implementation of better work method.	2
	Second midterm exam	2
	List of design exercises	DE hours
	Design example of manufacturing process.	3
	Detailed elaboration of manufacturing process, raw material selection, tools selection and calculation of process time.	3
	Autonomous students work on manufacturing documentation for individual project tasks	7

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. The presence exercises in the amount of at least 80 % of the times scheduled. Individual project tasks completed.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	1	Research		Practical training	
	Experimental work		Report		Individual work	2,7
	Essay		Seminar essay		(Other)	
	Tests	0,2	Oral exam		(Other)	
	Written exam	0,1	Project	1	(Other)	

Grading and evaluating student work in class and at the final exam

During semester there are two midterm exams. The requirements for passing grade are positive assessment of individual project and positive assessment in exam. Positive assessment represents minimal 50% points on each midterm exam or minimal 50% points on final exam. In the first two final exams students that did not pass at least one of the midterm exams take part. In the third and fourth final exams students take the whole exam regardless results of midterm exams. Final exams are conducted in written form. Midterm exams and final exams consist of theoretical questions and numerical problems.

Grade (%) = 0,4D + 0,6E

D – Individual project grade (%)
E – average points achieved on midterm exams expressed as a percentage or number of points achieved on the final exam expressed as a percentage.

E = (M1 + M2)/2
M1, M2 – average points achieved on midterm exams expressed as a percentage.

Grade (%):	Final mark:
50% - 60%	sufficient (2)
61% - 75%	good (3)
76% - 90%	very good (4)
91% - 100%	excellent (5)

Required literature (available in the library and via other media)	Title	Number of copies in the library	Availability via other media
	Gjeldum, N.: „Tehnološka priprema proizvodnje“, lectures on e-learning, FESB Split		Internet (e-learning)
	Gačnik, V., Vodenik, F.: „Projektiranje tehnoloških procesa“, Tehnička knjiga, Zagreb, 1990.	10	

	Taboršak, D., "Studij rada", Orgadata, Zagreb, 1994.	2	
	Car, M., Krznar, M., Šimon, K., "Studij rada – zbirka zadataka i rješenja", Liber, Zagreb, 1983.	1	
Optional literature (at the time of submission of study programme proposal)	1. Toboršak, D., Gornik, B., Čala, I., „Priprema proizvodnje“, Inženjerski biro, Zagreb, 1974. 2. Buchmeister, B., Polajnar, A.: „Priprava proizvodnje za delo v praksi“, Fakulteta za strojništvo, Maribor, 2000. 3. Polajnar, A., "Študij dela", Univerza v Mariboru, Fakulteta za strojništvo, Maribor, 1999 4. WEB catalogues		
Quality assurance methods that ensure the acquisition of exit competences	- keeping records of the attendance of students - annual evaluation of teachers - periodical evaluation of individual project advancement - feedback from students via surveys - self-evaluation of teachers - institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">MATERIALS 3</td></tr>
<tr><td>Code</td><td>FETL01</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Nikša Krnić, PhD, Associate professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Domagoj Kojundžić, Teaching Assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>45</td><td></td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5">10%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">To offer students the basic and specialists knowledge about main engineering materials types – metallic and non-metallic materials - polymeric, ceramics and composites. Among non-ferrous and special metals emphasis is on light structural metals and alloys – aluminium, titanium and magnesium, their properties, manufacturing technologies and typical industrial applications. It is the intention to depict the properties of modern materials used for structures with accent on mechanical and technological properties along with examples ot their typical uses. It is the intention to learn students how to select the adequate material for specific applications.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Successfully accomplished undergraduate part of the study and passed exams of Materials 1, Materials 2, Technology 1 and Technology or adequate subjects.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">After successful completion of course students should be able to:
- distinguish the advantages and drawbacks of main material types and their basic structures as a basis for assessment of certain properties,
- analyse and evaluate main effects of manufacturing technologies and service conditions on the properties of the engineering materials,
- recommend the heat treatment procedure of precipitation hardening aluminium alloys and to define the specifics and correlation of microstructure with properties,
- identify the effects of electric arc welding on light metals,
- critically evaluate the possibilities of selection and application of light metals, various steels indluding stainless, nickel alloys, polymeric, ceramic and composite materials and recommend suitable material according to the engineering needs for specific service condition,
- combine and to apply the acquired knowledge of contemporary structural materials for manufacturing technologies and applications in transport industry, energetics, medical engineering ...,
- assess the engineering and structural materials regarding impacts on people and environment and to apply that knowledge in the multidisciplinary and team work.</td></tr>
<tr><td rowspan="4">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L hours</td></tr>
<tr><td colspan="6">Introduction to engineering materials. Design and materials. Material selection and selection criteria.</td><td>3</td></tr>
<tr><td colspan="6">Aluminium and its alloys – production, structure, properties, main alloying elements and alloy families, tempers and applications. Precipitation heat treatment natural and artificial ageing, recrystallization and full annealing. Aluminium and Al alloys manufacturing with emphasis on welding, weldability and issues by fusion and solid state joining.</td><td>5</td></tr>
<tr><td colspan="6">Titanium and its alloys – production, structure, properties, main alloying elements and Ti alloy types and applications. Titanium and Ti alloys manufacturing with emphasis on welding, weldability and issues by</td><td>4</td></tr>
</table>

	fusion and solid state joining.	
	Magnesium and its alloys – production, structure, properties, main alloying elements, Mg alloys and applications. Main peculiarities of magnesium and its alloys manufacturing.	3
	Microalloyed and high strength steels, stainless steels, steels for low and high temperature applications.	3
	Short overview of corrosion, corrosion mechanisms, types and metallic material corrosion issues. Corrosion testing and methods of corrosion improvements by proper material selection, heat treatment, design, surface coatings and other protection methods.	3
	First midterm exam	
	Polymer materials – production, structure, properties – advantages and drawbacks. Thermoplastic, termosets and elastomers - typical industrial and structural applications. Manufacturing processes of polymer materials.	4
	Engineering ceramics – production, structure, properties. Oxide- and non-oxide ceramics. Carbon as a monocomponent ceramic (graphite, diamond, fullerene, nanotubes). Types and properties of glasses. Typical industrial and structural ceramic applications. Discontinuities, defects and issues by ceramic use. Basic manufacturing processes of ceramic materials.	4
	Definition and main types of composite materials - metal matrix (MMC), polymer matrix (PMC) and ceramic matrix (CMC) composites. Structure and properties of composites. Matrix and strengthening phase materials. Composite production technologies. Typical industrial applications of composite materials.	5
	Material's surface modification technologies – Physical (PVD) and Chemical Vapour Deposition (CVD), surface mechanical treatment. Shape memory alloys.	3
	Metallic glasses and foams. Recycling.	2
	Second midterm exam	
	List of laboratory exercises	LE hours
	Practical experimentation with aluminium alloys heat treatment - precipitation hardening by natural and artificial ageing.	4
	Practical demonstration of different aluminium alloys welding - weldability and issues by fusion welding.	2
	Demonstration of titanium electric arc welding - weldability and difficulties encountered. Suitable protection during welding.	2
	Experimental example of layered PM composite material production by hand lay-up technique.	2
	Experimental example of layered PM composite material production by vacuum bagging technique.	2
	Demonstration of magnesium and its alloys or stainless steels – welding aspects.	(1)
	Working and educational visit to industrial companies dealing with composite materials production or light metal manufacturing production and technologies (an additional but nonmandatory learning opportunity for students).	(3)
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	Mandatory minimum attendance: 70 % for the lectures and 85 % for lab exercises. Approved reports from every lab exercise.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1,5	Research		Practical training	
	Experimental work		Report	0,5	Individual work	2,5
	Essay		Seminar essay		Laboratory exercises	0,5
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are the two written midterm or partial exams in regular terms during the semester (after 7 weeks and the second is after 15 weeks) each encompassing approximately 1/2 of thought course topics. Students who successfully complete both midterm exams are administered to short oral check before course completion. Unsuccessful termination of one or more partial exams qualifies students for final written exam and oral check. Final grade is formed primarily upon the success on midterm partial written exams or on final written exam and on oral check. Regularity of student's attendance of lectures and exercises and quality of laboratory exercises reports influence the final grade if this is in between. The prerequisites for a positive grade are 50% points on each midterm or on the written exam. Grading policy is according to the following scheme: sufficient (2) for 50 % to 61 % of total points, good (3) for 62 % to 74 %, very good (4) for 75 % to 87 % and excellent (5) for 88 % and more of total points. Examination terms are according to the FESB schedule announced regularly at the beginning of the academic year.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Duplančić, I., Krnić, N.: "Materijali 3", e-book, FESB, Split 2011.		
	Deželić, R.: „Osnove konstrukcijskih materijala", Sveučilište u Splitu, FESB, 1996.		
	Suvremeni materijali i postupci, various authors, Filetin, T., Editor, HDMT, Zagreb, 2005.		
	Raos, P.; Šercer, M.: Teorijske osnove proizvodnje polimernih tvorevina, SF, Slavonski Brod, 2010.		

Optional literature (at the time of submission of study programme proposal)	1. Callister, W. D. Jr.: Fundamentals of Materials Science and Engineering, An Integrated Approach, II. Ed., John Wiley and Sons, Inc. 2005. 2. Altenpohl, D. G.:Aluminium: Technology, Applications, and Environment, The Aluminum Association, Inc., The Minerals, Metals & Materials Society, 1998. 3. Maier, H. R.: Leitfaden Technische Keramik, Wekstoffkunde II Keramik, Lehrstuhl und Institut fuer Keramische Komponenten in Maschinenbau, (IKKM), RWTH Aachen, 1999. 4. Backerud, L.; Krol, E.; Tamminen, J.: Solidification Characteristics of Aluminium Alloys, Vol. 1: Wrought Alloys, Skan Aluminium, 1986. 5. Other professional and scientific publications – journals and proceedings in Croatian and English language and selected WEB sites dealing with advanced metallic or other types of engineering materials
Quality assurance methods that ensure the acquisition of exit competences	- Encourage students to attend the lectures and exercises and to control it - Evaluation of results in accordance with the learning outcomes - Feedback from students via surveys - Self-evaluation of teachers
Other (as the proposer wishes to	

add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">MATHEMATICS – SPECIAL TOPICS</td></tr>
<tr><td>Code</td><td>FEML01</td><td>Year of study</td><td colspan="6">1</td></tr>
<tr><td>Course teacher</td><td>Ivan Slapničar, Ph.D., Full Professor</td><td>Credits (ECTS)</td><td colspan="6">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Lana Periša, Teaching assistant
Anita Carević, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td colspan="2">DE</td></tr>
<tr><td>30</td><td>0</td><td>30</td><td>0</td><td colspan="2"></td></tr>
<tr><td>Status of the course</td><td>obligatory</td><td>Percentage of application of e-learning</td><td colspan="6">15</td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:
- understanding concepts of selected advanced mathematical topics: integrals depending on parameters, calculus of variations, and partiial differential equations
- applications of the above concepts to mechanical engineering and other technical sciences.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:
- derive and apply methods for solving integrals depending on parameters,
- explain the main idea of calculus of variations, derive the necessary conditions and state sufficient conditions for extrema,
- reproduce solutions of classical problems of the shortest time and smallest surface area,
- define Sturm-Liouville problem and explain the structure of the solution, recognize and solve simpler problems,
- derive heat equation, Laplace equation and wave equationa, and state possible initial and boundary conditions,
- prove the uniqueness of the solution and solve the equations with appropriate methods (using eigenfunctions or Fourier and Laplace transforms),
- solve simpler wave equations in the case of linear and nonlinear waves,
- recognize and solve Volterra and Fredholm integral equations,
- define and compute Green function for the Sturm-Liouivuille problems.</td></tr>
<tr><td rowspan="12">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="6">1. Integrals depending on parameters.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">2. Calculus of variations, necessary and sufficient conditions for extrema.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">3. Examples of calculus of variations, conditional extrema, Euler's method of finite differences.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">4. Fourier and Laplace transform.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">5. Sturm-Liouville problem.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">6. Diffusion equation.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">7. Heat equation.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">8. Laplace equation.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">9. Wave equation - linear waves.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">10. Wave equation – nonlinear waves.</td><td>2</td><td>2</td></tr>
<tr><td colspan="6">11. Volterra and Fredholm integral equations.</td><td>2</td><td>2</td></tr>
</table>

	12. Green's function.	2	2
	13. D'Alembert solution of the wave equation.	2	2
	List of laboratory or design exercises		LE or DE hours
Format of instruction	x lectures ☐ seminars and workshops x exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	x independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)	
Student responsibilities	Regular attendence to and active participation in lectures and excercises.		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Self study	2
	Essay		Seminar essay		(Other)	
	Tests	0.5	Oral exam		(Other)	
	Written exam	0.5	Project		(Other)	

Grading and evaluating student work in class and at the final exam	During semester two mid-term exams are held. The first exam is scheduled after 7 weeks of lectures, and the second in the week following the lectures. At each mid-term exam students can get 40 points, while the remaining 20 points are attained through assignements during lectures and excercises. The condition for passing the course is minimum 20 points on each mid-term exams and a total of at least 50 points. After semester, two final exams and two correction exams are held. Students which did not pass one mid-term exam, can take only this part of the exam during final exams. Students which did not pass any mid-term exam, take the final exam with comprehensive course content. In that case, masimum numbers of available points is 80. The condition for passing the course is minimum 40 points in the final exam and a total of at least 50 points. The grade is formed as follows: 85 and more points - excellent (5), 75-84 points - very good (4), 60-74 points - good (3), and 50-59 points - sufficient (2). Students who did not pass the course after final exams, and have obtained total of at leat 10 points, can attend corrections exam. On the correction exam maximal number of points is 80, and the minimum requirement for a passing grade is minimum of 40 points in the exam and a total of at least 50 points. Mid-term exams, final exams and correction exams are held according to the exam schedule.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	I. Slapničar, Matematika 2, FESB, Split, 2002, chapters: Integrals depending on parameters and Calculus of variations.		http://www.fesb.unist.hr/mat2
	I.		
	J. D. Logan, Applied Mathematics, 3rd Edition, Wiley and Sons, New York, 2006.		
	Lecture materials on FESB e-learning portal.		httpd://elearning.fesb.unist.hr
Optional literature (at the time of submission of study programme proposal)	- P. duChateau, D. W. Zachmann, Partial Differential Equations, Schaum's Outline, McGraw Hill, New York, 1986.		
Quality assurance methods that ensure the acquisition of exit competences	- homework - short tests - quizzes - mid-term exams - final exam - student questionnaires		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">MEASUREMENT AND EXPERIMENTAL ANALYSIS OF VIBRATION</td></tr>
<tr><td>Code</td><td>FESL21</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Željan Lozina, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Damir Sedlar, Ph. D., Assistant Professor
Tomac Ivan, Ph. D., Assistant Professor</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for independent vibration measurement (measurement of displacement, velocity and acceleration signals) and basic experimental modal analysis. Introduce students with the basics of the machine fault diagnostics.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- explain basic concepts of vibration testing, e.g. sampling frequency, under sampling, leakage, frequency response function, correlation,…
- explain and apply measuring equipment for the vibrational testing using the selected procedures (e.g. use of the modal identification methods such as: circle fit, log. decrement and similar on the data acquired by the impact testing procedure)
- carry out experimental modal analysis using the standard equipment and commercial software
- carry out identification of common machine faults such as: imbalance, cracked or broken gear tooth,…
- understand order tracking procedure and explain Campbell plot diagram</td></tr>
</table>

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Single degree of freedom (SODF) systems	6	6
	Two degrees of freedom systems	6	6
	Multi degrees of freedom (MDOF) systems, continuous systems	6	6
	Vibration sensors, vibration exciters, measurement chain Measurement of the frequency response function (FRF)	2	2
	Analysis of measured signals in the time domain	3	3
	Analysis of measured signals in the frequency domain	3	3
	System identification and active vibration control	4	4

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	Students are to attend classes, at least 70%. Students are to come to classes on time, do tasks and participate in activities.	

Screening student	Class attendance	2	Research		Practical training	

<table>
<tr><td rowspan="4">work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Experimental work</td><td></td><td>Report</td><td></td><td>Independent work</td><td>3</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the course time students are to do their homework assignments. Due for the each homework assignment is one weak, usually on the next class.
Students are given the seminars. Generally, by the end of semester students are to orally discuss homework assignments and seminars which are both evaluated together.
Students are to: do homework assignments L (%), do the seminar S (%) and take two midterm exams: M1 (%), M2 (%).
Total (%) = 0,05(L+S)+0,45(M1+M2)
50% of total points is require to pass the course.

Final course grade is determined on the following criteria:
15% of lowest rated students – sufficient (2)
35% of following students – good (3)
35% of the next following students – very good (4)
15% of top rated students – excellent (5)

In the total number of students which passed the course is less then 30, then following grade criteria is applied:
50.00-62.50 – sufficient (2)
62.51-75.00 – good (3)
75.01-87.50 – very good (4)
87.50< – excellent (5)

Autumn exam: if students do not pass an exam on mid-terms and during exam period after ending of semester, but if they have achieved minimum of 25%, they are to take written exam again in the autumn exam period. Exam is consisted of theoretical part which includes simple test queries and numerical part covering total matter of the course. Maximum allowed grade is sufficient (2).</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Ž. Lozina – handouts</td><td></td><td>e-learning portal</td></tr>
<tr><td colspan="4">K. G. McConnell: Vibration testing theory and practice, John Wiley & Sons. Inc., 1995.</td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- D.J. Ewins: Modal testing: Theory, Practice and Application, 2001.
- J. He, Z.F. Fu: Modal analysis, Butterworth Heinemann, 2001.
- R. C. Eisenmann: Machinery malfunction diagnosis and correction, Prentice Hall, 2000.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- tracking students if they attend courses
- yearly analysis of final results of exams
- evaluation of teachers by students
- selfevaluation of teachers
- return information from graduated students regarding the relevance of the course</td></tr>
<tr><td>Other (as the</td><td colspan="6"></td></tr>
</table>

proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="4">MECHANICAL DRIVES</td></tr>
<tr><td>Code</td><td>FESL20</td><td>Year of study</td><td colspan="2">1</td></tr>
<tr><td>Course teacher</td><td>Srdjan Podrug, Ph.D., Associate Professor</td><td>Credits (ECTS)</td><td colspan="2">5</td></tr>
<tr><td>Associate teachers</td><td></td><td>Type of instruction (number of hours)</td><td colspan="2">L: 30 · S: 0 · AE: 30 · LE: 0 · DE: 0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="2">0</td></tr>
<tr><td colspan="5">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="4">Knowledge of the principles of operation and design of more complex mechanical drives.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="4">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="4">Students will be able to:
- Design and calculate bevel gears.
- Compare crossed gear and hypoid drives.
- Design and calculate worm gear drives.
- Design and calculate planetary gear trains.
- Calculate belt and chain drives.
- Compare continuously variable transmissions.</td></tr>
<tr><td rowspan="14">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="2">Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td colspan="2">Gear drives for inclined shafts. Bevel gears.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Geometry and manufacturing methods for bevel gears. Virtual gears.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Forces in mesh. Pitting and tooth root load capacity.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Crossed gear drives. Hypoid drives.</td><td>2</td><td></td></tr>
<tr><td colspan="2">Worm gear drives. Geometry and working of worms and wormwheels.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Manufacturing methods of worms and wormwheels. Flank shapes.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Forces acting on worm gear pair. Load capacity of worm gear pair. Elements of worm gear drive design.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Planetary gear trains. Definition and classification. Planetary transmission kinematics. Transmission ratio.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Mating conditions. Forces, torques and power of planetary gear trains. Efficiency.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Special layouts of simple planetary gear trains. Composed planetary gear trains.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Belt drives. Basics. Calculation. Flat, V and timing belts.</td><td>2</td><td>4</td></tr>
<tr><td colspan="2">Chain drives. Geometry. Design and calculation.</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Continuously variable transmissions.</td><td>2</td><td>2</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning</td><td colspan="3">☐ independent assignments
☒ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
</table>

	☐ field work					
Student responsibilities	Course attendance and activity (lectures, exercises), studying.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	3
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	During the semester, there will be two mid-term exams (tests). The first mid-term, after 7 weeks of classes, and the second after 13 weeks of classes. In the final exams students that did not pass the midterm exams take part. Grade (%) = 0,3M1 + 0,7M2 M1 - points of first mid-term exam expressed in percentage, this mid-term exam consists of theoretical questions. M2 - points of second mid-term exam expressed in percentage, this mid-term exam consists of numerical tasks (Z) and theoretical questions (T2). Points are formed in a manner: M2 = 0,57Z + 0,43T2. The requirement for a positive evaluation is the positive assessment of the first mid-term M1 >= 45%, and the second mid-term Z >= 45% and T2 >= 45%. The final grade is determined as follows: Percentage - Rating 50% to 61% - Sufficient (2) 62% to 74% - Good (3) 75% to 87% - Very good (4) 88% 100% - Excellent (5) Students who do not get positive evaluation through mid-term exams take written numerical and theoretical exam.					

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Jelaska, D: Gears and Gear Drives, University of Split, 2011. (in Croatian)	10	
	Podrug, S.: Machine Elements - Workbook, 2005. (in Croatian)		e-learning portal
	Jelaska, D., Podrug, S.: Worm Drives Design (Directions), FESB, Split, 2008. (in Croatian)		e-learning portal
	Jelaska, D., Podrug, S.: Belt Drives Design (Directions), FESB, Split, 2001. (in Croatian)		e-learning portal
Optional literature (at the time of submission of study programme proposal)	- Jelaska, D.: Gears and Gear Drives, John Wiley & sons Ltd, 2012. - Decker, K.H.: Machine Elements, Tehnička knjiga, Zagreb, 2006. (in Croatian) - G. Niemann: Maschinenelemente I, II, Springer Verlag, 1990. (in German)		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	MECHANICS OF MATERIALS 3						
Code	FESL15	Year of study	2.				
Course teacher	Frane Vlak, Ph. D., Associate Professor	Credits (ECTS)	5				
Associate teachers	Marko Vukasović, Ph. D., Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE
			30	0	30	0	0
Status of the course	Elective	Percentage of application of e-learning	0				

COURSE DESCRIPTION

Course objectives	Training students for: - understanding and application of basic laws of theory of elasticity, - introducing to methods of analysis of 2D physical models and 2D models that could be approximately considered as one-dimensional models.
Course enrolment requirements and entry competences required for the course	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - explain basics of plane theory of elasticity, - use the solutions for bending of thin-walled beams by power series, - explain the influence of shear on bending of beams, - explain the theory of torsion of the beams with noncircular cross sections, - use torsion-membrane analogy, - explain the theory of torsion of thin-walled beams with open cross sections, - use solutions for torsion of thin-walled beams with open cross sections.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	AE hours
	Intorduction to plane theory of elasticity. Fundamental equations.	2	2
	Boundary conditions.	2	2
	Solutions represented by power series defined in rectangular coordinates.	2	2
	Torsion of beams with noncircular cross sections.	2	2
	Torsion-membrane analogy.	2	2
	Torsion of thin-walled beams.	2	2
	Solution methods for torsion of thin-walled beams.	2	2
	First midterm exam		
	Introduction to theory of thin-walled beams with open cross sections.	2	2
	Sectorial properties of plane areas.	2	2
	Fundamental equations.	2	2
	Boundary conditions.	2	2
	Torsion of thin-walled beams with open cross sections.	2	2
	Method of initial parameters.	2	2
	Second midterm exam		

Format of instruction	☒ lectures	☒ independent assignments

<table>
<tr><td></td><td colspan="3">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2,0</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2,7</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0</td><td>Laboratory exercises</td><td></td></tr>
<tr><td>Tests</td><td>0,2</td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td></td></tr>
<tr><td>Written exam</td><td>0,1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. Grade (in percentage) is formed according to the formula:
Grade(%) = 0,5 (M1 + M2)
the activities in percentage:
• M1, M2 – test results.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Alfirević, I.: Linearna analiza konstrukcija, Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje, Zagreb, 1999.</td><td>3</td><td></td></tr>
<tr><td colspan="4">Pavazza, R.; Uvod u analizu tankostjenih štapova, Zagreb, 2007.</td><td>3</td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- Filin, A.P.: Prikladnaja mehanika tverdogo deformireumogo tela, tom I, Nauka, Moskva, 1975.
- Solecky, R., Conant, R. J.: Advanced Mechanics of Materials, Oxford University Press, New York, Oxford, 2003.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

NAME OF THE COURSE	**METAL STRUCTURES DESIGN**						
Code	FESL11	Year of study	2				
Course teacher	Željko Domazet, Ph.D., Full Professor, Lovre Krstulović-Opara, Ph.D., Full Professor	Credits (ECTS)	5				
Associate teachers	Miro Bugarin, Ph.D.,Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE
			30	0	0	0	30
Status of the course	Elective	Percentage of application of e-learning	40%				

COURSE DESCRIPTION

Course objectives	Training students for: - Designing and maintaining of simple metal structures. Acquiring knowledge from types of structural materials, optimal designing, typical joints, corrosion and testing (control) of metal structures. - Design and project documentation based on CAD software SolidWorks. - Numerical modelling of metal structure based on finite element simulation and software ADINA.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Conceive and construct simple metal structure. - Prove the structure carrying capacity. - Explain calculation of weldments and bolt connections. - Carry out anti-corrosive protection. - Use results of finite element model simulation. - Carry out calculation of weldment and bolt connection. - Describe non-destructive testing base on visual testing, magnetic particles inspection, ultrasound testing and penetrant testing.

Course content broken down in detail by weekly class schedule (syllabus)

Course content	L or S hours	AE hours
Introduction to metal structures and structural design. Contracting of metal structures.	4	
Materials for metal structures (Aluminium alloys and steel)	4	
Actions on structures according to HRN, DIN, EUROCODE 3	4	
Metal structures optimal design.	2	
Bolt connections with dimensioning.	4	
Weldments with dimensioning.	4	
Design of weldments and bolt connections with respect to fatigue.	2	
Anti-corrosive protection.	2	
Contracting and renewal of anti-corrosive protection.	2	

List of laboratory or design exercises	DE hours
Introduction to SolidWorks and creating metal structure concept in SW.	8
Demonstration of NDT methods (visual testing, penetrant testing, magnetic particles inspection, ultrasound testing)	4
Introduction to the finite element method software ADINA	8
Simulation of structure loading in ADINA.	8

<table>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☐ exercises
☐ *on line* in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Evaluation of gained knowledge in form of two colloquiums.
Maximal score is 100 points, while minimum is passing of exam is with 50 points.
Exam: individual, theoretical.
Mode of exam: written form.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Ž. Domazet, L. Krstulović-Opara, Skripta iz Metalnih konstrukcija (in Croatian)</td><td></td><td>E-learning</td></tr>
<tr><td colspan="4">Additional course materials</td><td></td><td>E-learning</td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- EUROCODE 1
- EUROCODE 3
- B. Androić, D. Dumović, I. Džeba, Metalne konstrukcije I, Institut građevinarstva Hrvatske, Zagreb 1994.
- A. Vukov, Uvod u metalne konstrukcije, Fakultet građevinskih znanosti Sveučilišta u Splitu, Split 1998.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Student evaluations
- Registering student’s attendance to course</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

NAME OF THE COURSE	**MODELING AND OPTIMIZATION OF TECHNOLOGICAL PROCESSES**						
Code	FETL27	Year of study	2				
Course teacher	PhD Branimir Lela, Assistant Professor PhD Sonja Jozić, Assistant Professor	Credits (ECTS)	5				
Associate teachers		Type of instruction (number of hours)	L	S	AE	LE	DE
			30	15	15		
Status of the course	Elective	Percentage of application of e-learning	10 %				

COURSE DESCRIPTION			
Course objectives	Training students for: - modeling and optimization of technological processes by means of various mathematical models - acquire knowledge of the experiments planning of and their analysis		
Course enrolment requirements and entry competences required for the course	None		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - categorize mathematical models used for modeling and optimization of technological processes - create mathematical models to describe technological processes - design a plan of experiments to prove a hypothesis - analyse the results of mathematical models and the results of experiments - evaluate the optimal parameters of a technological process - critically evaluate the results obtained from mathematical models simulation		
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Models and their importance in technical and natural sciences	2	
	Model definition. Types of models. The definition, purpose and objective of modeling.	2	
	Testing of homogeneity of the dispersion of experiment.		2
	Modeling of processes and systems.	2	
	Modeling of technological processes.	2	
	Determination of errors and confidence of experiment.		2
	Analytical modeling. Stochastic modeling. Experimental design.	2	
	The experiment as a means of achieving optimal production parameters.	2	
	Numerical processing of result if the function is known and unknown.		2
	Types of experiments. Experimental error. Processing and interpretation of experimental results. Analysis of variance. Regression analysis.	2	
	Modeling of forces in deep drawing process.		2
	First midterm exam		
	Defining of the mathematical model. Linear and nonlinear, parametric and nonparametric mathematical models.	2	
	Modeling by means of artificial intelligence (artificial neural networks, genetic algorithms, fuzzy logic, support vectors).	2	

	Modeling of tool life in turning.		2
	Optimization of technological processes.	2	
	Optimization methods (analytical methods, statistical methods, mathematical programming).	2	
	Modeling based on theory of dimensionality: cutting forces, deep drawing forces.		2
	Examples of application of modeling and optimization in machining and metal forming.	2	
	Examples of application of modeling and optimization in technology of casting and heat treatment.	2	
	Modeling by neural networks and support vectors.		2
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay	1	(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. In the makeup exam students take the entire exam. The requirements for passing grade is 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = (M1 + M2) / 2 M1, M2 – test results of first and second midterm exam. Final grade is determined according to: Percentage Grade 50% do 61% sufficient (2) 62% do 74% good (3) 75% do 87% very good (4) 88% do 100% excellent (5) Examination terms: according to the timetable.

Required literature	**Title**	**Number of**	**Availability via**

(available in the library and via other media)		**copies in the library**	**other media**
	Jurković, M., "Matematičko modeliranje i optimizacija obradnih procesa", Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 1999.		
	Stanić, J., "Metod inženjerskih merenja, Osnove matematičke teorije eksperimenata, Mašinski fakultet, Beograd, 1986.		
	Dixit, P.M., Dixit, U.S., "Modeling of Metal Forming and Machining Processes", Springer, 2008.		
	Davim, J.P., "Statistical and Computational Techniques in Manufacturing", Springer, 2012.		
Optional literature (at the time of submission of study programme proposal)	- DeVries, W.R., " Analysis of Material Removal Processes", Springer, 1992. - Rao, R.V., "Advanced Modeling and Optimization of Manufacturing Processes", Springer, 2011.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">NONCONVENTIONAL MACHINING PROCESSES</td></tr>
<tr><td>Code</td><td>FETL22</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Sonja Jozić, Ph. D., Assistant Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>45</td><td>0</td><td>0</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- acquisition of basic knowledge of nonconventional methods in the field of machining.
- acquisition of technical knowledge about possibilities of nonconventional machining processes in order to solving engineering problems in this area</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:

- identify nonconventional machining processes and their application
- analyze the role of different types of energy in nonconventional machining processes
- identify the motive of application of nonconventional machining processes from the viewpoint of workpiece material
- create a diagram of nonconventional machining processes that connects the power source, working fluid and interaction with the workpiece material
- present machining system and the effects of nonconventional machining processes
- combine nonconventional machining processes according to the product requirements
- present application of nonconventional machining processes in modern industries</td></tr>
<tr><td rowspan="10">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction. Main terms, definitions and classification of nonconventional machining processes.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Mechanical processes. Ultrasonic machining. Water jet machining. Abrasive jet machining.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Mechanical processes. Abrasive water jet machining. Ice jet machining. Magnetic abrasive finishing.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Chemical processes. Chemical milling. Photochemical milling. Electropolishing.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Electrochemical processes. Electrochemical machining. Electrochemical drilling.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Thermal processes. Electrodiscarge machining. Mechanism of material removal. The machining system.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Thermal processes. Electrodiscarge machining. Types of machining. Application of EDM.</td><td>3</td><td></td></tr>
<tr><td colspan="5">First midterm exam</td><td></td><td></td></tr>
<tr><td colspan="5">Thermal processes. Laser beam machining.Introduction in LBM. Types of industrial laser. Interaction with workpiece</td><td>3</td><td></td></tr>
</table>

	material.		
	Thermal processes. Laser beam machining. Mechanism of material removal. Application of the LBM.	3	
	Thermal processes. Electron beam machining. Plasma beam machining. Ion beam machining.	3	
	Comparison of different nonconventional machining processes. Surface quality and effectveness of nonconventional machining processes.	3	
	Hybrid nonconventional machining processes	3	
	Thermal assisted conventional machining processes. Trends of development of nonconventional machining processes.	3	
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours
	Mechanical processes - organized students visit to the Shipyard Brodosplit		3
	Thermal processes - organized students visit to the Shipyard Brodosplit		3
	Chemical processes - demonstration		2
	Electrochemical processes - demonstration		2
	Determining of the parameters of ultrasound and abrasive machining		2
	Determining of the parameters of electrochemical and electrodischarged machining		2

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work	0,25	Report		Reports from the laboratory exercises (Other)	0,25
	Essay		Seminar essay		Preparation for lecturing	0,25
	Tests		Oral exam		Individual work	2,25
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. In the makeup exam students take the entire exam. The midterm, final and makeup exams are carried out as written tests. The requirements for passing grade is: 5. Positive assessment of laboratory exercises 6. 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M 1 + M 2) M1, M2 – test results of first and second midterm exam. Final grade is determined according to: Percentage Grade 50% do 61% sufficient (2)

	62% do 74% good (3) 75% do 87% very good (4) 88% do 100% excellent (5) Examination terms: according to the timetable.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Jozić: „Nonconventional machining processes“ lecturing, eLearning, 2015.	0	eLearning portal
	H.A.G. El-Hofy, "Advanced Machining Processes", McGraw-Hill, 2005.	0	
	Walker, J., R., "Machining Fundametals", The Goodheart-Willcox Company, Inc. Tinley Park, Illinois, 2000.	0	
Optional literature (at the time of submission of study programme proposal)	Hocheng H., Tsai H.Y. (editors) H.A.G. "Advanced Analysis of Nontraditonal Machining", Springer Science+Bussiness Media New York, 2013. - Čuš, F., "Postopki odrezavanja", Univerza v Mariboru, Fakulteta za strojništvo, Maribor, 2009.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Feedback information from graduated students		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	**NUMERICAL SYNTHESIS IN ENGINEERING**							
Code FESL49		Year of study	5					
Course teacher	Prof.dr.sc.Damir Vučina	Credits (ECTS)	5					
Associate teachers	Igor Pehnec	Type of instruction (number of hours)	L	S	AE	LE	DE	
			45			15		
Status of the course	elective	Percentage of application of e-learning						
COURSE DESCRIPTION								
Course objectives	- Acquire theoretical foundations, methods and algorithms related to shape synthesis for given functionality by applying geometric modelling and multi-objective optimization - Develop competences in applying computers in numerical synthesis in engineering - Acquire capacity to competently apply numerical tools to engineering problems							
Course enrolment requirements and entry competences required for the course	Succesfully completed courses equivalent to Computer-aided analysis and Optimization methods. Competences related to basic methods of engineering analysis and program development in C and MATLAB							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Formulate the engineering problem as a parametric model for shape optimization - Model the problem as a set of decision variables, constraints and excellence functions - Model the excellence using valuation methods - Develop flowcharts for numerical workflows involving modula for geometric modelling, simulation (e.g.FEA) and optimization - Solve multiobjective problems related to constrained non-linear programming - Apply evolutionary optimization methods and metaheuristics - Apply surrogate models replacing simulators, - Develop and test complex models and numerical computational processes using advanced integral tools -							

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Inroductory concepts	3	
	Modelling 2D shape and configuration	3	
	Modelling 3D shape	3	
	Modelling functionality and excellence	3	
	Modelling project value of project elements	3	
	Shape optimization	3	
	Multi-objective optimization	3	
	Evolutionary algorithms and operators	3	
	Metaheuristics	3	
	Model reduction and surrogate models	3	
	Parameterization and optimization of shape and topology	3	
	Numerical workflows in shape optimization	3	
	Engineering applications	3	
	List of laboratory or design exercises		LE or DE hours

	Introductory application examples	1
	Modelling 2D and 3D shape and configuration	3
	Modelling project value of project elements	1
	Multi-objective optimization	1
	Evolucijski algoritmi i operatori	1
	Metaheuristics	1
	Surrogate models	1
	Numerical workflows in shape optimization	3
	Engineering applications	1

Format of instruction	v lectures ☐ seminars and workshops v exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	v independent assignments ☐ multimedia v laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	3	Research		Practical training	
	Experimental work		Report		Project work	2
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Exam: theoretical and practical or project Grade(%) = 0,5*M1 + 0,5*M2 M1, M2 – percentage at mid-term exam and final exam respectively 50% do 61% (2) 62% do 74% (3) 75% do 87% (4) 88% do 100% (5)

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	-D. Vučina, 'Metode inženjerske numeričke optimizacije', Sveučilište u Splitu, FESB 2005		
	K. Deb, Multi-objective optimization using Evolutionary Algorithms, Wiley, 2001		
	S. Haykin, "Neural Networks", Prentice Hall International, 1999		
	D. Rogers, An Introduction to NURBS, Morgan Kaufmann Publishers, 2000		
	-D. Vučina, 'Metode inženjerske numeričke optimizacije', Sveučilište u Splitu, FESB 2005		

Optional literature (at the time of submission of study programme proposal)	J. S. Arora, "Introduction to Optimum Design", McGraw Hill, 2012 S.S. Rao, "Engineering Optimization", Wiley Interscience, 1996 G. Farin, Curves and Surfaces for Computer Aided Geometric Design: A Practical Guide, Morgan Kaufmann Publishers/ Academic Press, 2002 A. Saxena, B. Sahay, Computer-aided engineering design, Springer 2005

Quality assurance methods that ensure the acquisition of exit competences	The annual analysis of examination efficacy. Student survey in order to evaluate teachers. Self-evaluation of teachers. Feedback from students who have already graduated from the relevance of the course content.
Other (as the proposer wishes to add)	In English or Croatian language.

NAME OF THE COURSE	**OPTIMIZATION METHODS**						
Code	FESL05	Year of study	1				
Course teacher	Damir Vučina, Ph. D., Full Professor	Credits (ECTS)	5				
Associate teachers	Igor Pehnec, Ph. D., Teaching assistant, Ivo Marinić- Kragić, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE
			45	0	0	15	0
Status of the course	Obligatory	Percentage of application of e-learning	0				

COURSE DESCRIPTION

Course objectives	Acquiring theoretical know-how in basic numerical methods and algorithms in engineering optimization. Developing competences in applying computers in engineering numerical optimization. Acquire competences in applying numerical tools in engineering problems.
Course enrolment requirements and entry competences required for the course	Completed pre-graduate studies which include courses equivalent to computer-aided analysis. Competences in basic engineering analysis methods and program development in C and MATLAB
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completing the course the students will be able to: - formulate the engineering problem as an engineering problem of decision making - model the set of decision variables, constraints and excellence functions for engineering problems - make flowcharts for different optimization methods - apply gradient optimization methods (HJ, NM) to engineering problems - apply non-gradient optimization methods (SD, CG, N, BFGS) to engineering problems - solve nonlinear optimization problems with constraints - apply evolutionary optimization methods and metaheuristics (GA; ACO, SA, NN) to engineering problems - apply optimization methods to network problems: min. path, min. spanning tree, max. flow, .. - develop and test own optimization models and methods in MATLAB

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	AE hours
	Introduction, basic theoretical concepts. Basic terms and examples of application.	3	
	Basic concepts, theoretical aspects, optimization models	3	
	Linear programming, standard model	3	
	Linear programming, simplex method	3	
	Nonlinear programming, 1D methods: Interval halving, Fibonacci, Golden section, Interpolation methods, reduction of nD problems to 1D	3	
	Nonlinear programming, n-dimensional methods for unconstrained problems: direct methods (Random	3	

	search, Hookee-Jeeves, Powell, Nelder-Mead, other)		
	Nonlinear programming, n-dimensional methods for unconstrained problems: gradient methods (Steepest descent, Conjugate directions method, Newton and Quasi- Newton methods)	3	
	First midterm exam		
	- Nonlinear programming, constrained n-dimensional method: transformation methods (external and intternal penalty methods, other)	3	
	- Nonlinear programming, constrained n-dimensional method: basic concepts in direct methods: (feasible directions, generalized reduced gradients, SLP, SQP,..)	3	
	Basic concepts in evolutionary methods and special chapters: simulated annealing, genetic algorithms, etc.	3	
	Basic concepts in evolutionary methods and special chapters: neural networks as approximators	3	
	Basic concepts and procedures: optimization with discrete variables, branch and bound, GAs. Network problems shortest path, min. spanning tree, max. flow	3	
	Examples of setting-up physical and mathematical models for optimization for different engineering problems. Development of algorithms. Development of progams in C and MATLAB.	3	
	Second midterm exam		
	List of laboratory exercises		LE hours
	Basic terms and examples of application.		1
	Optimization models		1
	Linear programming, standard model, examples		1
	Linear programming, Simplex method, examples		1
	Nonlinear programming, 1D methods, examples		1
	Nonlinear programming, unconstrained n-dimensional methods, examples		1
	Nonlinear programming, unconstrained n-dimensional methods, examples		1
	Nonlinear programming, (NLP) constrained n-dimensional methods, examples		1
	Nonlinear programming, (NLP) constrained n-dimensional methods, examples		1
	Examples of application of neural networks		1
	Examples in evolutionary methods, genetic algorithms		1
	Examples in evolutionary methods, genetic algorithms		1
	Examples of application in engineering and modeling		1
Format of instruction	☒ lectures	☐ independent assignments	

<table>
<tr><td rowspan="1"></td><td colspan="4">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="2">☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled.
Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>3</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Laboratory exercises</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of respective theoretical questions and numerical problems. The final tests consist of overall theoretical questions and numerical problems. In the final exams, students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is the positive assessment of laboratory exercises and 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula:
Grade(%) = 0,5 (M1 + M2)
the activities in percentage:
• M1, M2 – test results.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">- D. Vučina, 'Metode inženjerske numeričke optimizacije', Sveučilište u Splitu, FESB 2005</td><td></td><td></td></tr>
<tr><td colspan="4">- J. S. Arora, “Introduction to Optimum Design”, McGraw Hill, 1989</td><td></td><td></td></tr>
<tr><td colspan="4">I.Pehnec, Materijali za laboratorijske vježbe</td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- G. Vanderplaats, "Numerical Optimization Techniques for Engineering Design", - Vanderplaats Research and Development, 1999
- A. D. Belegundu, T. R. Chandrupatla, “Optimization Concepts and Applications in Engineering”, Prentice Hall, 1999
- S.S. Rao, “Engineering Optimization”, Wiley Interscience, 1996
- D.E. Goldberg, "Genetic algorithms in search, optimization and machine learning", Addison Wesley, 1989
- S. Haykin, "Neural Networks", Prentice Hall International, 1999</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

NAME OF THE COURSE	**PLANT LAYOUT**							
Code	FETL05	Year of study	2.					
Course teacher	Ivica Veža, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Marko Mladineo, Ph. D., Teaching assistant	Type of instruction (number of hours)	P	S	AV	LV	KV	
			30	0	0	15	15	
Status of the course	Obligatory	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	Educate students to be able to: • realize feasibility study in projecting a new production system, • project of phases of production system (define macro and micro locations, surfaces, basic elements of building, basic production structures, work conditions), • understand basics of material flow calculation, human factor, information and energy.
Course enrolment requirements and entry competences required for the course	Course enrolment requirements: None Required competences: Competences and skills achieved after finishing bachelor studies of industrial engineering, mechanical engineering and naval architecture
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1. Analyse content of previous study realized, 2. Compare criteria in micro and macro location selection phase, 3. Define number of workplaces, 4. Create transport intensity chart, 5. Compare layout according to processing type (Workshop principle) and purpose groups, 6. Define production surface with discontinuity coefficients method, 7. Analyse functional surfaces (sketch machine with functional surface, unit field and height of factory hale), 8. Apply achieved knowledge and skills on real example

Course content broken down in detail by weekly class schedule (syllabus)	Course content	P hours	AV hours
	Introduction. Term “system”, system types. Production system.	2	
	Scope, nature and objectives of design of production process.	2	
	Basic principles in production process modelling.	2	
	Interrelations of basic factors in production.	2	
	Previous study.	2	
	Location problems. Main factors for micro and macro location selection.	2	
	Production system segmentation.	2	
	Production surface calculation, defining of functional surfaces on workplace. Distances between machines and elements.	2	
	Calculation of block scheme of surface layout. Election of basic building parameters.	2	
	Material flow types. Spatial structure designing.	2	
	Layout methods for cases with group by types.	2	
	Production and assembly lines balancing	2	
	Workplace and work conditions designing. The appearance of fatigue. Work conditions.	2	

	List of laboratory exercises	LV hours
	Introduction to spatial structures	2
	Layout according to purpose. Production line balancing	2
	Layout according to purpose. Modified triangle method	2
	Layout with fixed position. Hungary method	2
	Layout problem with predefined locations	2
	Transportation problems	2
	Program task setting	1
	List of construction exercises	**KV hours**
	Capacity load calculation	2
	Transport units defining	2
	Defining of optimal spatial layout	2
	Storage calculation	2
	Required surface calculation	2
	Preparation of technical drawing of projected production system	2
	Handover of program task	1

Format of instruction	☒ Lectures ☒ Seminary work and workshops ☒ Exercise ☐ *on line* in full ☐ mixed e-learning ☐ fieldwork lectures	☒ Solo tasks ☐ Multimedia ☒ Laboratory work ☒ Mentorship ☐ (other)
Student responsibilities	Presence on lectures and auditory exercise minimally 70% in total. All laboratory exercise and project task realized.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1,0	Research		Practical training	
	Experimental work		Report		Individual work	1,5
	Essay		Seminar essay		Laboratory exercises	0,5
	Tests	0	Oral exam		Preparation for laboratory exercises	
	Written exam		Project	2,0	(Other)	

Grading and evaluating student work in class and at the final exam	During the semester it will be realized two colloquiums. First is after 7 weeks of lectures, and second after 6 weeks. Students have possibility to retake again part of the curriculum on final exam, if they didn't pass in regular dates. Each of colloquiums has to be written as a written exam in duration of 45 minutes. Each colloquium has 5 theoretical questions. Passing condition is 40% of total points on each of colloquiums and project task done. To students are introduced phases of production system modelling. Therefore, besides lectures, they are attending to laboratory exercises and according to them, they realizing production system modelling. Students presenting their project tasks on colloquium and those tasks are also included in grade forming (grade KV). • KV – grade from lectures, • LV – grade from laboratory work, • M1, M2 – colloquium points. Final grade (in percent) formed according to formula: Grade (%) = 0,20 KV + 0,20 LV + 0,3 (M1 + M2)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Veža, I., Bilić, B., Bajić, D., "Projektiranje proizvodnih sustava", Fakultet elektrotehnike,		e-learning portal

	strojarstva i brodogradnje, Split, 2001.		
Optional literature	Aggteleky, B., “Fabrikplanung: Werksentwicklung und Betriebsrationalisierung.- Band 1,2,3”., Carl Hanser Verlag, München, 1990. Schenk, M., Wurth, S., “Fabrikplanung und Fabrikbetrieb Methoden für die wandlungsfähige und vernetzte Fabrik”, Springer Verlag, Berlin, Heidelberg New York, 2004.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Annual analysis of the performance of the examinations - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	**POWER SYSTEM OPERATION AND CONTROL**							
Code	FENI09	Year of study	2					
Course teacher	Prof. dr. sc. Elis Sutlović	Credits (ECTS)	6					
Associate teachers	Tomić Ivan Vjeko	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	15	15	0	
Status of the course	Elective	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	Training students for: - acquiring knowledge of classical and modern control systems in power plants and overall power system, - understanding the issues as well as methods and procedures in the process of power system control, both in traditionally organized and in the restructured and liberalized system, - introduction to the operating principles of ENTSO-e.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1. Identify and describe the functions of the system operator. 2. Explain the process of load-frequency control of isolated power system and of interconnected power system. 3. Calculate and coordinate primary, secondary and tertiary regulation in the process of load–frequency control. 4. Explain the process of reactive power and voltage control in electric power systems 5. Calculate and coordinate operational measures to maintain voltage limit in transmission and distribution networks. 6. Describe and classify system services and ancillary services in a liberalized power system. 7. Describe and identify the requirements to the SCADA system at the level of the power facility. 8. Describe and analyze the SCADA in power system. 9. Apply the appropriate software tools for power system operating and control.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	AE hours
	Functions of system operator. The issue of regulation in the electric power system.	2	0
	Load–frequency control: basic concepts and characteristics of speed governing, regulation of a generator	2	2
	Load–frequency control: load modelling, composite frequency response characteristics of the system–	2	4
	Load–frequency control: primary control, secondary control, tertiary control, AGC	2	4
	Load–frequency control: regulation of interconnected networks, tie-line oscillations, quality of control	2	3
	Load–frequency control: – under-frequency load shedding, frequency protection relays	2	0
	Load–frequency control: – operating principles of ENTSO-e	2	0
	First midterm exam		
	Reactive power and voltage control – production and absorption of reactive power	2	

	Reactive power and voltage control – primary voltage regulation, secondary voltage regulation, tertiary voltage regulation	2	
	Reactive power and voltage control – operating principles of ENTSO-e	1	
	System services and ancillary services in a liberalized power system. Ancillary services in the Croatian power system	3	
	Concept of SCADA systems	2	
	The hierarchical structure and functions of remote control centers in the Croatian power system	2	
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours
	PowerWorld Simulator – basic features of PowerWorld		2
	PowerWorld Simulator – creating one line diagram and inserting data of various elements		2
	PowerWorld Simulator – creating model of “small grid 1” and simulation of Load–frequency control on simulation case.		2
	PowerWorld Simulator – simulation of Load–frequency control on the model of Dalmatia transmission network		2
	PowerWorld Simulator – creating model of “small grid 2” and simulation of Reactive power and voltage control on simulation case.		2
	PowerWorld Simulator – simulation of Reactive power and voltage control on the model of Dalmatia transmission network.		2
	Visit and tour of „Network control center – Split“		3

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1,5	Research		Practical training	
	Experimental work		Report		Individual work	3,5
	Essay		Seminar essay		Laboratory exercises	0,5
	Tests	0,2	Oral exam	0,1	Preparation for laboratory exercises	0,2
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. The first midterm is carried out as written exam and it consists of 3 theoretical questions and 2 numerical problems. The second mid-term is carried out as oral exam and it consists of 4 to 5 theoretical questions. The requirement for passing grade is 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,05 (AL + LA) + 0,45 (M1 + M2) the activities in percentage: • AL - attendance at lectures, • LA – laboratory assessment, • M1, M2 – test results.

<table>
<tr><td></td><td colspan="3">The final grade is determined as follows:
<u>Percentage</u> <u>Description</u>
50% do 61% Sufficient (2)
62% do 74% Good (3)
75% do 87% Very Good (4)
88% do 100% Excellent (5)</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>E. Sutlović: Predavanja iz upravljanja i vođenja u elektroenergetskom sustavu</td><td></td><td>e-learning portal</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">- P. Kundur: Power System Stability and Control, McGraw_HillUCTE Operation Handbook, 2004
- J. Machowski. J. Bialek, J. Bumby: Power System Dynamics: Stability and Control, Wiley, 2008.
- E. Mariani and S.S. Murthy: Advanced Load Dispatch for Power System: Principles, Practices and Economies, Springer-Verlag, London, 1997.
- Wood, B. Wollenberg: Power Generation, Operation and Control, ISBN 0-471-09182-0, John Wiley &Sons, 1984.
- M. i K. Ožegović: Električne mreže II, FESB, Split, 1980.
- Čalović, M.S.: Eksploatacija elektroenergetskih sistema, Beopres, Beograd, 1999.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="6">PRODUCT DEVELOPMENT AND MANAGEMENT</td></tr>
<tr><td>Code</td><td>FESL16</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Lovre Krstulović-Opara, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4">40%</td></tr>
</table>

Note: DE column of Type of instruction: DE = 30.

<table>
<tr><td colspan="3">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="3">Training students for:
- Effective product management during product life cycle under changing market conditions and requests.
- Acquiring knowledge about product structure and product architecture.
- Understanding phases of product life cycle.
- Systems and packages supporting Product life cycle management (PLM).
- Concept generation for emerging concepts and concept visions.
- Understanding and using Product data management (PDM) package as part of SolidWorks.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="3">Design of industrial products.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="3">Students will be able to:
- Explain PDM system and it's interactions with other applications.
- Describe process of implementation and set up of PLM system.
- Count advantages of PLM system in enterprises.
- Describe product lifecycle.
- Describe product concept design.
- Describe team for concept design.
- Paraphrase concept design in car industry.
- Describe concepts in insecure market.
- Describe concepts of visions.
- Design as a team work simple industrial product based on PDM SolidWorks system.</td></tr>
<tr><td rowspan="15">Course content broken down in detail by weekly class schedule (syllabus)</td><td>Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td>Systems for Product lifecycle management (PLM).</td><td>2</td><td></td></tr>
<tr><td>Product structure. Integration of PLM with other applications.</td><td>2</td><td></td></tr>
<tr><td>Implementation and setting of PLM system</td><td>2</td><td></td></tr>
<tr><td>Advantages of using PLM systems.</td><td>2</td><td></td></tr>
<tr><td>Product lifecycle.</td><td>2</td><td></td></tr>
<tr><td>Product concept design.</td><td>2</td><td></td></tr>
<tr><td>Team for concept design.</td><td>2</td><td></td></tr>
<tr><td>Process of generating concepts. User information in process of product development.</td><td>2</td><td></td></tr>
<tr><td>Concept design in car industry.</td><td>2</td><td></td></tr>
<tr><td>Concept design in insecure markets.</td><td>4</td><td></td></tr>
<tr><td>Concepts of visions.</td><td>4</td><td></td></tr>
<tr><td colspan="2">List of laboratory or design exercises</td><td>DE hours</td></tr>
<tr><td colspan="2">CAD modelling in SolidWorks</td><td>4</td></tr>
</table>

	CAD modelling in SolidWorks PDM for Workgroups.	4
	Organising of product development groups.	2
	Product dissemination.	4
	Defining CAD data basis (vault)	4
	Defining CAD supplement applications.	4
	Presentation of student projects.	4

Format of instruction	☒ lectures ☒ seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☒ work in project groups
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	1
	Essay		Seminar essay	2	(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	Evaluation of gained knowledge in form of two colloquiums. Maximal score is 100 points, while minimum is passing of exam is with 50 points. Exam: individual, theoretical. Mode of exam: written form.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Product Development and Management (script in process of review)		E-learning
	Additional course materials		E-learning

Optional literature (at the time of submission of study programme proposal)	- L. Krstulović-Opara, Ž. Domazet, Dizajni industrijskih proizvoda – mrežna skripta - Ulrich, K.; Eppinger, S., "Product Design and Development", Irwin, McGraw-Hill, 2008.
Quality assurance methods that ensure the acquisition of exit competences	- Student evaluations - Registering student's attendance to course
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">PRODUCTION MANAGEMENT</td></tr>
<tr><td>Code</td><td>FETL09</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>Ivica Veža, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marko Mladineo, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>45</td><td>0</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students to:
• production planning and management
• making/drafting technological oriented investment projects
• be able to simulate the materials flow</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Competences and skills learning outcomes of undergraduate study in industrial engineering, naval architecture or mechanical engineering.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
1. Analyze the business model of supply chain management.
2. Analyze the concept of production planning and control.
3. Evaluate management models of production data.
4. Model and simulate the operation of a flexible/intelligent manufacturing system.
5. Recommend software solutions for integrated planning and production management.
6. Apply simulation programs on production problems.
7. Apply acquired knowledge and skills from previous courses on solving the specific task.
8. Prepare technology oriented investment project.</td></tr>
<tr><td rowspan="11">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Production function. Production management. Production management strategies.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Product designs. New product developing process.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Supply chain (Supply chain management).</td><td>3</td><td></td></tr>
<tr><td colspan="5">Production planning and control.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Materials planning and inventory control.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Concepts for production planning and control: network techniques planning, methods of optimal capacity utilization.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Procedure Just in time – JIT.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Method for manufacturing resource planning (MRP, MRP II, ERP),</td><td>3</td><td></td></tr>
<tr><td colspan="5">Optimized production technology, OPT, management progressive numbers. Improvements. Methods and improvement techniques.</td><td>3</td><td></td></tr>
<tr><td colspan="5">Production systems simulation.</td><td>3</td><td></td></tr>
</table>

	Globalization. Social responsibility. Environment responsibility.	3	
	Concept of planning business based on technology. Revive of technology and innovation in technology.	3	
	Preparing Technology oriented Investment Project (TIP). Evaluation and demonstration TIP. TIP budgeting. Risks and risks reduction TIP.	3	
	List of laboratory or design exercises		LE or DE hours
	Single production. Project management.		2
	Introduction to the Network planning technique.		2
	Time analysis.		2
	CPM method.		2
	PERT method.		2
	PRECEDENCE method.		2
	Cost analysis.		2
	Resource analysis.		2
	Introduction to inventory management.		2
	EOQ and ROP methods.		2
	Probability methods and safety supplies.		2
	JIT method.		2
	Introduction to MRP, MRP-II i ERP.		2

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☒ laboratory ☒ work with mentor ☐ (other)
Student responsibilities	Presence on lectures and exercises at least 70% of the teaching hours. Settled ALL provided laboratory exercises and preparation of terms references.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1,0	Research		Practical training	
	Experimental work		Report		Independent work	1,5
	Essay		Seminar essay		Laboratory exercises	0,5
	Tests	0	Oral exam		Preparation for laboratory exercises	
	Written exam		Project	2,0	(Other)	

Grading and evaluating student work in class and at the final exam	During the semester there will be two mid-term exams (tests). The first is the pre-exam after 7 weeks of classes, the second after the next 6 weeks. On final exam students take the test with parts of matter they did not pass in med terms. Every midterm is a written exam that students write for 45 minutes, and has 5 questions. To have a passing grade students have to gain at least 40% of every midterm. On the other hand, students have a colloquium on the Technique of network planning (LE) through first written colloquium at the end of first semester. • LE – grade for laboratory exercises • M1, M2 – points on mid-term exams The final score (in percentage) is formed according to the formula: Grade(%) = 0,30 LE + 0,7 (M1 + M2)

Required literature	**Title**	**Number of**	**Availability via**

<table>
<tr><td rowspan="6">(available in the library and via other media)</td><td></td><td>copies in the library</td><td>other media</td></tr>
<tr><td>Dulčić, Ž., Pavić, I., Rovan, M., Veža, I., “Proizvodni management”, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture – Faculty of Economics, Split, 1996.</td><td>5</td><td></td></tr>
<tr><td>Schroeder, R. G., “Upravljanje proizvodnjom”, MATE, Zagreb, 1999.</td><td>5</td><td></td></tr>
<tr><td>Veža, I., Bilić, B., Gjeldum, N., Mladineo, M., “Upravljanje projektima”, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2011.</td><td></td><td>e-learning</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">Slack, N., Chambers, S., Johnston, R., “Operations Management”, Prentice Hall, Harlow, 2004. Wild, R., “Operations Management” Continuum, 2002.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Tracking the presence on classes
Academic year analyses-grades and exams success
Student survey contain teacher evaluation
Teacher self-evaluation
Graduated student feedback about the relevance of syllabus content</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

NAME OF THE COURSE	PRODUCTION PLANNING AND CONTROL							
Code	FETL06	Year of study	2.					
Course teacher	Boženko Bilić, Ph.D. Full Professor	Credits (ECTS)	5					
Associate teachers	Marko Mladineo, Ph. D., Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	15	15	0	
Status of the course	Obligatory	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	- Introduce students with the basic tasks of production management - Teach students the basic methods and tools for production management
Course enrolment requirements and entry competences required for the course	Completed undergraduate study industrial engineering, naval architecture or mechanical engineering.
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - Explain the strategies of introducing new products to the market - Recommend organizational structure of the company - Plan the required production capacity - Develop basic layout of production equipment - Design a project network diagram and Gantt chart - Optimize the total cost of the project - Plan material inventory for the independent and dependent demand - Evaluate the quality management system.

Course content broken down in detail by weekly class schedule (syllabus)

Course content	L hours	AE hours
Introduction. Types of industrial productions. Organizational structures	2	0
Production function and production strategy	2	0
Strategies for new product introduction. Process of new product development.	3	3
Product lifecycle management	2	1
Basis of production and manufacturing processes design.	3	3
Types of production plans. The cycles of production.	2	0
First midterm exam		
PROJECT MANAGEMENT	4	3
INVENTORY PLANNING AND CONTROL: Inventories in an independent demand	3	0
INVENTORY PLANNING AND CONTROL: Inventories in an dependent demand	2	3
QUALITY MANAGEMENT	3	0
Second midterm exam		

List of laboratory exercises	LE hours
QFD metoda.	2
Project management: Project network diagrams (network planning techniques) and gantt chart. Project structure analysis - project phases and activities. Project time management using project network diagrams.	4
Project management: Project cost management using project network diagrams.	2
Project management: Resource planning.	2
5S method	1

<table>
<tr><td>Format of instruction</td><td colspan="4">☒ lectures
☐ seminars and workshops
☒ exercises
☐ *on line* in entirety
☐ partial e-learning
☐ field work</td><td colspan="2">☒ independent assignments
☒ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures and exercises in the amount of at least 70 % of the times scheduled. Perform all laboratory exercises. Individual project tasks completed.</td></tr>
<tr><td rowspan="5">Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*</td><td>Class attendance</td><td>1,5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2,5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0,5</td><td>Laboratory exercises</td><td>0,5</td></tr>
<tr><td>Tests</td><td>0</td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td>0</td></tr>
<tr><td>Written exam</td><td>0</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During semester there are two midterm exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. The student can take the first midterm exam if he/she regularly attended classes. Requirements for access to the second midterm exam are: regularly attended classes, at least 25% of points achieved at the first midterm and positively evaluated individual seminar
Midterm exams are conducted in written form. They consist of theoretical questions and numerical problems. The teacher reserves the right to hold a midterm exam in oral form. The requirement for passing grade represents minimal 50% points on each midterm exam:

$$\text{Grade (\%)} = 0{,}5(M1 + M2)$$
M1 – first midterm grade (%), i.e. percentage points achieved on the first midterm
M2 – second midterm grade (%), i.e. percentage points achieved on the second midterm
Requirements for access to the final exams are: regularly attended classes and positively evaluated individual seminar. In the two final exams students that did not pass at least one of the midterm exams take part. In the third and fourth final exams students take the whole exam regardless results of midterm exams. Final exams are conducted in written form. They consist of theoretical questions and numerical problems. The teacher reserves the right to hold a final exams in oral form. The requirement for passing grade is positive assessment in exam. Positive assessment represents minimal 50% points on final exam.

Grade (%): **Final mark:**
50% - 60% sufficient (2)
61% - 75% good (3)
76% - 90% very good (4)
91% - 100% excellent (5)

Grade (%) is average points achieved on midterm exams expressed as a percentage or number of points achieved on the final exam expressed as a percentage.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="4">**Title**</td><td>**Number of copies in the library**</td><td>**Availability via other media**</td></tr>
<tr><td colspan="4">J. B. Dilworth: Operations Management: Providing value in goods and services, South-Western College Pub, 1999.</td><td>0</td><td></td></tr>
<tr><td colspan="4">J. W. Stevenson: Production/Operations</td><td>1</td><td></td></tr>
</table>

	Management, Irwin Professional Publishing, 1998.		
	R. G. Schroeder: Upravljanje proizvodnjom: Odlučivanje u funkciji proizvodnje, MATE d.o.o., Zagreb, 1999.	0	
Optional literature (at the time of submission of study programme proposal)	- B. Bilić: Predavanja postavljena na e-learning portalu - ***"Inženjerski priručnik IP4 – sv. 3", str. 195-236, Školska knjiga, Zagreb, 2002. - A. Vila, A., Z. Leicher: Planiranje proizvodnje i kontrola rokova", Informator, Zagreb, 1983.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of the attendance of students - Annual evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Feedback from students who have already graduated related to the relevance of the course content		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">PROFESSIONAL TRAINING</td></tr>
<tr><td>Code</td><td>FEXX06</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Head of the professional training from the Faculty</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Head of the professional training from the private institution</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- consolidating theoretical knowledge and practical skills in solving highly complex engineering problems
- acquaintance with the organization, work and business of the receiving institution,
- solving practical problems,
- inclusion in the labour market,
- writing technical reports</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Acquired 120 ECTS credits</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- consolidate theoretical knowledge and practical skills in solving problems
- use literature, databases and other sources of information
- select appropriate methods and procedures for solving practical problems
- apply technical knowledge and skills to effectively solve engineering problems
- prepare a written report on the work results</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Professional training is the independent work of the student performed in the receiving institution in accordance with the plan and programme agreed between the head of the professional training from the receiving institution and the head of professional training from the Faculty.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="7">Independent work</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td colspan="2">4</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Independent work</td><td colspan="2"></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Report writing</td><td colspan="2">1</td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td colspan="2"></td></tr>
<tr><td>Grading and evaluating student</td><td colspan="7">Professional training is not evaluated. Students are obliged to complete professional training in accordance with the Regulation on professional training and</td></tr>
</table>

work in class and at the final exam	to write a Professional training report. Professional training report is validated by the head of professional training from the receiving institution and the head of professional training from the Faculty.		
Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
Optional literature (at the time of submission of study programme proposal)			
Quality assurance methods that ensure the acquisition of exit competences	- Questionnaire on professional training - Self-evaluation of the head of professional training - Student survey of the whole study programme		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">QUALITY ASSURANCE</td></tr>
<tr><td>Code</td><td>FETL16</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td>Course teacher</td><td>Boženko Bilić, Ph.D. Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marko Mladineo, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>15</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">- The promotion of quality as a fundamental criterion for survival companies in the market
- Introducing students with modern principles, techniques and methods of quality assurance
- Introducing students with the modern systems and principles of quality management.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Completed undergraduate study industrial engineering, shipbuilding or mechanical engineering.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Distinguish quality control, quality assurance and quality management
- Construct a control charts for variables and control charts for attributes
- Apply some sampling procedures for inspection by attributes and by variables
- Assess the capability of process
- Apply the some tools and methods of quality assurance
- Explain the establishment and operation of a quality management system
- Comment different quality management systems
- Evaluate (teamwork) quality management system according to requirements of international standard ISO 9001</td></tr>
</table>

<table>
<tr><td rowspan="8">Course content broken down in detail by weekly class schedule (syllabus)</td><td>Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td>INTRODUCTION: Definitions of quality. The historical development of quality. Traditional and modern approach to quality.
QUALITY LEVELS: quality control, quality assurance, quality management.
QUALITY AND LEGISLATION - Responsibility as a result of poor quality.
QUALITY COSTS</td><td>2</td><td>0</td></tr>
<tr><td>QUALITY AND RELIABILITY</td><td>2</td><td>2</td></tr>
<tr><td>QUALITY CONTROL: Internal and external quality control. On-line quality control and off-line quality control. Basic quality control tools</td><td>2</td><td>0</td></tr>
<tr><td>APPLICATION OF THE THEORY OF PROBABILITY AND STATISTICS IN THE QUALITY CONTROL.</td><td>2</td><td>3</td></tr>
<tr><td>STATISTICAL PROCESS CONTROL: Variation in process (special causes of variations and common causes of variations). Process capability analysis - process capability indexes</td><td>2</td><td>2</td></tr>
<tr><td>STATISTICAL PROCESS CONTROL: Control charts for variables. Control charts for attributes.</td><td>2</td><td>2</td></tr>
<tr><td>STATISTICAL QUALITY CONTROL: Acceptance sampling by attributes and by variables.</td><td>2</td><td>2</td></tr>
</table>

<table>
<tr><td rowspan="15"></td><td colspan="4">First midterm exam</td><td></td><td></td></tr>
<tr><td colspan="4">QUALITY ASSURANCE.
QUALITY ASSURANCE: Taguchi method. QFD method.</td><td>3</td><td>2</td></tr>
<tr><td colspan="4">QUALITY MANAGEMENT: Seven Management and Planning Tools (7QMT). FMEA method. Six-Sigma.</td><td>2</td><td>0</td></tr>
<tr><td colspan="4">QUALITY MANAGEMENT: Quality and standardization. Standard ISO 9000. Requirements of this International Standard ISO 9001.</td><td>2</td><td>0</td></tr>
<tr><td colspan="4">QUALITY MANAGEMENT: The establishment of quality management systems - Requirements that a company must fulfill. Preparing the necessary documentation. The application of the quality management system</td><td>2</td><td>0</td></tr>
<tr><td colspan="4">QUALITY MANAGEMENT: Internal audit of quality management system. Management review of quality management system. External audit of quality management system conducted by external independent auditing organization.</td><td>3</td><td>0</td></tr>
<tr><td colspan="4">Second midterm exam</td><td></td><td></td></tr>
<tr><td colspan="5">List of laboratory exercises</td><td>LE hours</td></tr>
<tr><td colspan="5">Measurement and control of physical quantities</td><td>3</td></tr>
<tr><td colspan="5">FTA method</td><td>2</td></tr>
<tr><td colspan="5">FMEA method</td><td>2</td></tr>
<tr><td colspan="5">QFD method</td><td>2</td></tr>
<tr><td colspan="5">5S</td><td>2</td></tr>
<tr><td colspan="5">Six sigma</td><td>2</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Format of instruction</td><td colspan="2">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="4">☒ independent assignments
☒ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1,5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2,5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0,5</td><td>Laboratory exercises</td><td>0,5</td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>Preparation for laboratory exercises</td><td>0</td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During semester there are two midterm exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. The student can take the first midterm exam if he/she regularly attended classes. Requirements for access to the second midterm exam are: regularly attended classes, at least 25% of points achieved at the first midterm and positively evaluated individual seminar. Midterm exams are conducted in written form. They consist of theoretical questions and numerical problems. The teacher reserves the right to hold a midterm exam in oral form. Positive assessment represents minimal 50% points on each midterm exam:
Grade (%) = 0,5 (M1 + M2)
M1 – first midterm grade (%), i.e. percentage points achieved on the first midterm
M2 – second midterm grade (%), i.e. percentage points achieved on the second midterm
Requirements for access to the final exams are: regularly attended classes and</td></tr>
</table>

<table>
<tr><td></td><td>positively evaluated individual seminar.
In the two final exams students that did not pass at least one of the midterm exams take part. In the third and fourth final exams students take the whole exam regardless results of midterm exams. Final exams are conducted in written form. They consist of theoretical questions and numerical problems. The teacher reserves the right to hold a final exams in oral form. The requirement for passing grade is minimal 50% points on final exam.

Grade (%): Final mark:
50% - 60% sufficient (2)
61% - 75% good (3)
76% - 90% very good (4)
91% - 100% excellent (5)

Grade (%) is average points achieved on midterm exams expressed as a percentage or number of points achieved on the final exam expressed as a percentage.</td></tr>
</table>

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	B. Bilić: Kvaliteta – Planiranje, analiza i upravljanje, University of Split, FESB, 2016.	5	
	I. Oslić: Kvaliteta i poslovna izvrsnost, M.E.P. Consult, Zagreb, 2008.	0	
	N. Vulić: Sustavi upravljanja kvalitetom, Veleučilište u Splitu, Split, 2001.	0	
	N. Injac: Mala enciklopedija kvalitete, I. dio – Upoznajmo normu ISO 9000, Oskar, Zagreb, 2002.	0	

Optional literature (at the time of submission of study programme proposal)	- B. Bilić: Predavanja postavljena na e-learning portalu - J. M. Juran, F. M. Gryna: Planiranje i analiza kvalitete, MATE, Zagreb, 1999. - N. Injac: Mala enciklopedija kvalitete, II. dio – Informacije; dokumentacija; auditi", Oskar, Zagreb, 2002. - M. Drljača: Mala enciklopedija kvalitete, V dio - Troškovi kvalitete, Oskar, Zagreb, 2004.
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of the attendance of students - Annual evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Feedback from students who have already graduated related to the relevance of the course content
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**REFRIGERATION**							
Code	FESL37	Year of study	2					
Course teacher	Nižetić Sandro, Ph. D., Associate Professor	Credits (ECTS)	5					
Associate teachers	Ivan Tolj, Ph. D., Teaching assistant Dario Bezmalinović, Ph. D., Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective.	Percentage of application of e-learning						
COURSE DESCRIPTION								
Course objectives	Training students for: - Classify and elaborate basic terms related to the refrigeration, - Implement basic thermodynamic calculations for different cooling systems (applications), - Classify and elaborate different refrigeration techniques and systems in general.							
Course enrolment requirements and entry competences required for the course	Thermodynamics 1, Mathematics 1, Mathematics 2.							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: -Consider and elaborate basic terms related to the general refrigeration systems, -Elaborate and implement basic thermodynamic calculations for different refrigeration systems, -Classify and elaborate unfavourable impacts of the refrigerants to the environment, -Describe and classify base equipment of the typical refrigeration system, -Numerate and describe different types of the refrigeration systems.							

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction to the refrigeration.	2 hours	2 hours
	Methods to obtain low temperatures. Idealised cooling cycles.	2 hours	2 hours
	Real cooling cycles cascade cooling cycle, multiple compressor stage cooling cycles, and efficiency improvement of the cooling cycles.	2 hours	2 hours
	Characteristics of the refrigerants, impact to the environment, selection of the refrigerant, retrofit of the refrigerant.	2 hours	2 hours
	Compressor types for cooling applications and base characteristics.	2 hours	2 hours
	Evaporators for cooling applications.	2 hours	2 hours
	Condensers for cooling applications.	2 hours	2 hours

	Other equipment of the refrigeration systems.	2 hours	2 hours
	Regulation of the refrigeration systems (basis).	2 hours	2 hours
	Performance of the refrigeration systems, coolers, air-conditioning devices, ice machines, etc.	2 hours	2 hours
	Different refrigeration systems.	2 hours	2 hours
	Different refrigeration systems.	2 hours	2 hours
	Different refrigeration systems.	2 hours	2 hours
	Introduction to the air-conditioning systems	2 hours	2 hours
	Introduction to the cryogenic techniques.	2 hours	2 hours
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required auditorium exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research	2	Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam		(Other)	
	Written exam		Project	1	(Other)	
Grading and evaluating student work in class and at the final exam						

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	S. Nižetić, Online predavanja: Rashladna tehnika, FESB, 2011.		
	Recknagel, Sprenger, Schramek, Čeperković: Grijanje i klimatizacija 2002, Energetika marketing,		

	Zagreb, 2002 (Prijevod sa njemačkog)		
	ASHRAE Handbooks: Fundamentals, Applications, Systems and Equipment, Refrigeration, ASHRAE, Atlanta, USA, 2012		
Optional literature (at the time of submission of study programme proposal)	- Časopis: EGE, Energetika marketing, Zagreb - Časopis: ASHRAE Journal, ASHRAE, Atlanta, USA.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">RENEWABLE ENERGY SOURCES AND SUSTAINABLE DEVELOPMENT</td></tr>
<tr><td>Code</td><td>FESL22</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Frano Barbir, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Dario Bezmalinović, Ph. D., Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Optional</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- Understanding the problematic of renewable energy sources (RES), their necessity, potential, limits, advantages and drawbacks
- Understanding the cutting edge technologies for utilization of RES
- Being able to make simple calculations of systems and system components for utilization of RES</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Understand the need for RES and critically assess their advantages and drawbacks
- Design and optimize systems, with all the necessary components, for utilizing RES
- Make a techno-economic analysis of the viability of the proposed systems</td></tr>
<tr><td rowspan="15">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction, definitions, current energy system problems, possible solutions</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Energy statistics for Croatia and the World</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Solar energy, Solar geometry</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Photovoltaics</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Solar thermal collectors</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Solar power plants</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Economic analysis of RES; multi-criteria analysis</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">First midterm exam</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Wind energy, wind turbines</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Hydropower, hydro power plants, water turbines, tidal power, marine current power, wave power</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Biomass, biofuels, geothermal energy and technologies for its utilization</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Hydrogen energy technologies</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Energy return on energy invested (EROI); definition of emergy, emergy analysis</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Future of RES, 100% supply from RES</td><td></td><td></td></tr>
</table>

		2	2
	Seminar presentation	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	To attend at least 70% of all the lectures and exercises	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1,5	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay	1	(Other)	
	Tests	0,5	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	During the semester there is one midterm exams and a seminar presentation at the end of the semester. The students that do not pass the midterm exam (or are not happy with their grades) have two final exam opportunities at the end of the semester and additional two opportunities at the end of the academic year on pre-decided dates. The midterm exam takes place after the first 7 weeks of lecturing. All the exams are carried out as written tests. The requirement for a passing grade is >49% points. On the first two final exams (at the end of the semester), the students are required to pass only the part which they failed to pass during the semester (midterm exam and/or seminar). On the second two final exams (at the end of the academic year), the students are required to pass the whole exam, regardless of their success during the semester. The final percentage is calculated as follows: Points (%) = (M1+S2)/2; where M1 and S2 are percentage points of the midterm test and the seminar, respectively. The final grade depends on the final percentage and is calculated as follows: 50% to 61% - fair (2), 62% to 74% - good (3), 75% to 87% - very good (4) and 88% to 100% - excellent (5) According to the Article 71 of the Faculty Statute, students are required to attend all forms of lectures and exercises by at least 70%. Students who fail to comply with this regulation will not be allowed to take the exams.

<table>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Lj. Majdandžić, Solarni sustavi, Graphis, Zagreb, 2010.</td><td></td><td>e-learning portal</td></tr>
<tr><td>F. Barbir, autorizirana predavanja,</td><td></td><td>e-learning portal</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">G. Boyle, Renewable Energy, Oxford University Press, 2004. (ili novije izdanje)</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Monitoring of students attendance during lectures and exams
- Annual analysis of the average exam success
- Feedback from students via surveys
- Self-evaluation of teachers</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

NAME OF THE COURSE	**ROBOTICS**						
Code	FELL03	Year of study	2.				
Course teacher	Mojmil Cecić, Ph. D., Full Professor	Credits (ECTS)	5				
Associate teachers	Stanko Kružić, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE
			30	0	30	0	0
Status of the course	Elective	Percentage of application of e-learning	0				

COURSE DESCRIPTION	
Course objectives	Training students for: - understanding and application of basic principles and laws of kinematics and dynamics of robots, - setting up and solving kinematics and dynamics problem of simple manipulator structures, - trajectory planning, - simulations using MATLAB, - using different methods for robot control, - develop the ability to work independently and work in a small group.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - describe the different mechanical structures of robots, - calculate kinematics of typical manipulator structures, - calculate dynamics of typical manipulator structures, - programming manipulators to perform simple tasks, - understand the different simulation principles, - understand the functionality of the actuators and sensors.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours
	Introduction, History of Robotics, Classification of Robots	2
	Robot Mechanical Structure, Degress of Freedom	2
	Kinematics, Rotation Matrix, Translation Matrix, Homogeneous Transformations	3
	Direct Kinematics, Denavit-Hartenberg Representation	3
	Kinematics of Typical Manipulator Structures	3
	Inverse Kinematics Problem	2
	Differential Kinematics and Statics, Jacobian	2
	Trajectory Planning	2
	Manipulator Dynamics, Lagrange Formulation, Inverse Dynamic Problem	3
	Joint Actuating System, Drivers	2
	Sensors	2
	Course content	AE hours
	Homogeneous Transformations	2
	Direct Kinematics	3
	Inverse Kinematics Problem	3
	Analytical Jacobian	2
	Dynamics	2
	Kinematics and Dynamics of Typical Manipulator Structure	4
	Programing languages	2

<table>
<tr><td rowspan="3"></td><td colspan="5">Programming of mobile robot</td><td>2</td></tr>
<tr><td colspan="5">Trajectory generation, Motion Control of Mobile Robots</td><td>2</td></tr>
<tr><td colspan="5">The Visual Servoing Problem</td><td>4</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2</td><td>Research</td><td></td><td>Practical training</td><td>0,2</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td>2,5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>0,2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>0,1</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks.

The requirement for passing grade is 50% points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula:
Grade [%] =0.5* (M1 + M2)
where M1 and M2 are the results of the midterm exams in percentage.

Each midterm test consists of 10 theoretical questions and numerical problems and final test also consists of 10 theoretical questions and numerical problems divided into two groups (the first and the second part). The requirement for passing grade is 50% of the total number of questions. The students who did not pass the midterm exams take part in the final exam. The midterm and final exams are carried out as written tests. Finally grade is determined as follows:
from 50% to 62.5% - dovoljan (2)
from 62.5% to 75% - dobar (3)
from 75% to 87.5% - vrlodobar (4)
from 87.5% to 100% - izvrstan (5)

Midterm and final exams are held in the terms provided by the time table.</td></tr>
<tr><td rowspan="3">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Saeed B. Niku: Introduction to Robotics: Analysis, Systems, Applications, Prentice Hall, 2001.</td><td>1</td><td></td></tr>
<tr><td colspan="4">Craig: Introduction to robotics, Mechanics and Control, Prentice Hill, 2010.</td><td>1</td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">- Tadej Bajd: Osnove robotike, Fakulteta za elektrotehniko, Univerza v Ljubljani, 2000.
- Kovačić, Laci, Bogdan: Osnove robotike, Fakultet elektrotehnike i računarstva, Zagreb, 1999.
- Siciliano, Sciavicco, Villani, Oriolo> Robotics, Springer, 2010.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers</td></tr>
</table>

	- Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">SHIP PROPULSION SYSTEM</td></tr>
<tr><td>Code</td><td>FESL30</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td>Course teacher</td><td>Gojmir Radica, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Dario Bezmalinović, Ph. D., Teaching assistant
Ivan Tolj, Ph. D.,Teaching assistant
Tino Sumić, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>45</td><td>0</td><td>15</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- understanding basic principles of marine propulsion,
- understanding application of marine propulsion systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Thermodynamics, Fluid Mechanics</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- analyze basic principles of marine propulsion
- recommend main propulsion engine for requested application, energy demand and according to rules and regulation,
- choose elements of propulsion system, fuel, oil, cooling systems and exhaust and ventilation system.</td></tr>
<tr><td rowspan="12">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Marine machineries development. Steam boilers.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Marine steam turbines.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Marine gas turbines.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Marine propulsion engines.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Marine two stroke low speed engine combustion.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Scavenging and exhaust.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Marine turbochargers.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Main parameters of marine engines</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Application of marine engine. Test bed and sea trial.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Fuel, oil, cooling systems.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Marine auxiliary engines, pumps, compressors.</td><td>2</td><td>2</td></tr>
</table>

	Propeller systems.	2	2
	Diesel-electric propulsion. Combined propulsion systems. IMO regulation.	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,5	Research		Practical training	
	Experimental work		Report		Individual work	2,2
	Essay		Seminar essay		(Other)	
	Tests	0,2	Oral exam		(Other)	
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests (oral test-if necessary). The requirement for passing grade is the positive assessment of exercises and 50 % points for theory and exam on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,54 (M1 + M2) the activities in percentage: • M1, M2 – test results.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Radica G. Predavanja iz predmeta Brodski propulzijski sustavi		e-learning
	Grljušić M. Pogonski pomorski sustavi. Interna skripta, FESB, 2001.	5	

	Šneller S, Parat Ž. Pogon broda II. Sveučilište u Zagrebu, FSB, 1999.	5	
Optional literature (at the time of submission of study programme proposal)	- Woodyard , D.:Pounder's Marine Diesel Engines and Gas Turbines,UK,2009. - Harrington, R.L., "Marine Engineering", SNAME, N.J. USA, 1992. - Haarlas, M., "Steam and Gas Turbines for Marine Propulsion", Naval Institute Press, Annapolis, Maryland, 1987. - Parat, Ž., "Brodski motori s unutarnjim izgaranjem", Sveučilište u Zagrebu, FSB,2005. - Ozretić, V., "Brodski pomoćni strojevi i uređaji", Split Ship Management, Split, 2004.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)	Available in English language.		

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">STATISTICS</td></tr>
<tr><td>Code</td><td>FEML02</td><td>Year of study</td><td colspan="6">1</td></tr>
<tr><td>Course teacher</td><td>Ante Rozga, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="6">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td colspan="2">AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td colspan="2">30</td><td>0</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="6">20</td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Getting to know the importance of statistical methods in the professional and scientific work. Independent analysis and interpretation of data obtained through statistical surveys. Statistical way of thinking with the help of probability theory. Qualification for independent reasoning with statistical estimation and hypothesis testing.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">After completing the course, students will be able to:
• Choose and apply methods of descriptive and inferential statistics.
• Calculate and interpret indicators of descriptive statistics.
• Estimate parameters, point estimate and interval estimate.
• Calculate the accuracy and reliability of statistical estimates.
• Set up and test the statistical hypothesis.
• Connect variable correlation analysis and regression analysis.
• Analyze and interpret the results of statistical surveys.
-</td></tr>
<tr><td rowspan="14">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="4">Course content</td><td colspan="2">L hours</td><td colspan="2">AE hours</td></tr>
<tr><td colspan="4">The Scales of Measurement. Grouping and Presentation of data.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Measures of Central Tendency. Measures of Variability. Measures of Skewness and Kurtosis.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Probability. Addition and Multiplication law. Conditional probability. Bayes theorem.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Discrete Random Variables. Discrete Probability Distributions.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Continuous Random Variable. Continuous Probability Distributions.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Sample Design. Point and Interval Estimation of Population Parameters.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Hypothesis Testing of One Mean. Hypothesis Testing of One Proportion.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">First Midterm Exam.</td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="4">Errors in Hypothesis Testing. Sample Size Design.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Hypothesis Testing of Difference between Two Population Means. Hypothesis Testing of Difference between Two Population Proportions. Dependent and Independent Samples.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Distribution Fitting. Goodness-of-Fit Tests.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Contingency Tables Tests.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td colspan="4">Analysis of Variance.</td><td colspan="2">2</td><td colspan="2">2</td></tr>
</table>

	Correlation.				2	2
	Second midterm exam					
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work			☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)		
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled..					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay		Laboratory exercises	
	Tests	1	Oral exam		Preparation for laboratory exercises	
	Written exam		Project		(Other)	
Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of 2 theoretical questions and 8 numerical problems and final tests consist of 4 theoretical questions and 10 numerical problems. Final grade is as follows: 50% - 61% sufficient 62% - 74% good, 75% - 87% very good, 88% - 100% excellent. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests.					
Required literature (available in the library and via other media)	**Title**				**Number of copies in the library**	**Availability via other media**
	A.Rozga: Statistika za ekonomiste. Ekonomski fakultet 2009.				2	
	I.Pavlić: Statistička teorija i primjena. Tehnička knjiga. Zagreb. 1985.				5	
					5	
Optional literature (at the time of submission of study programme proposal)	V.Vranić: Vjerojatnost i statistika. Tehnička knjiga 1971.					
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations					
Other (as the proposer wishes to add)						

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">SUSTAINABLE PRODUCTION</td></tr>
<tr><td>Code</td><td>FETM08</td><td>Year of study</td><td colspan="5">2.</td></tr>
<tr><td>Course teacher</td><td>Dražen Bajić, Ph. D., Full Professor
Branko Klarin, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Sonja Jozić, Ph. D., Assistant Professor
Mario Veić, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>15</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">10%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
- Understanding and use of basic knowledge of sustainable production in which the development of products and services takes place using processes and systems that do not pollute the environment,
- Set aside and suggest the type and implementation of sustainable systems that conserve energy and natural resources, ensuring the safety and health of workers, or products,
- Develop sensitivity and responsibility towards employees, society and customers.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Evaluate the product life cycle and production process,
- Establish and propose modern manufacturing technology,
- Relate and devise ways of rational use of energy,
- Select and sort out suitable solutions for sustainable energy production,
- Evaluate and recommend methods and procedures suitable processing of various materials,
- To present the principles of sustainable production,
- Analyze alternative cooling techniques,
- Comment modern materials for cutting tools,
- Compare additive technology and CNC machining in order to rapid prototyping and tooling,
- To analyze the possibilities of material machining high hardness.</td></tr>
<tr><td rowspan="8">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Introduction to sustainable production and historical development of the concept, principles of sustainable production, sustainable production problems.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Life cycle assessment of the product and production process.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Energy efficiency. Rational use of energy. New technologies. The circular economy.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Sustainable production of energy. Energy losses and insulation. Centralized and Distributed Systems.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Efficient use of material resources, materials in the environment, sustainable transport. Sustainable production trends.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Clean manufacturing and clean technologies, Kyoto and other protocols.</td><td>2</td><td></td></tr>
<tr><td colspan="5">Sustainable production and consumption of food, fisheries,</td><td>2</td><td></td></tr>
</table>

	organic production. Sustainable forest management and sustainable production of wood.		
	Energy production and energy losses.		2
	Energy efficiency and rational use of energy.		2
	Examples of sustainability from nature – biomimicry.		2
	Eco-innovation concepts.		2
	The sustainability of transportation systems.		2
	The consequences of unsustainable system and climate change.		2
	Circular Economy and New Technologies.		2
	First midterm exam		
	Modern production technology. Classification, Features.	2	
	Overview and features modern materials for cutting tools,significance and problems with recycling the coolant.	2	
	High speed without or with minimal use of coolantt. High dynamic CNC machines.	2	
	Machining of hard aterials, hard turning and milling. Economic analysis of the applicability of procedures as an alternative to grinding.	2	
	Alternative cooling techniques (krioegena, MQL, HKHZ).	2	
	Rapid prototyping and tooling.	2	
	Second midterm exam		
	List of laboratory or design exercises		LE or DE hours
	Sustainable development of production engineering. Hardmaching – Experimental investigation		2
	Comparative experimental study of different machining conditions - surface roughness.		2
	Comparative experimental study of different machining conditions - tool wear.		2
	Comparative experimental study of different machining conditions - cutting forces.		2
	The sustainability of product development by using reverse engineering - Catia V5 RE and 3D printing.		2
	The sustainability of product development by using reverse engineering - Catia V5 RE and CNC.		2

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay	1	Laboratory exercises	
	Tests		Oral exam		Preparation for laboratory exercises	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at	There are two midterms of final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. The first mid-term consists of a seminar essay presenting, in which students need to process a given topic in

<table>
<tr><td>the final exam</td><td colspan="3">the field of sustainable production. Work is assessed according to the criteria of absolute evaluation. Second midterm test is carried out as written test. In the final exams students that did not pass the midterm exams take part. The final exams are carried out as seminar essays grade (first part) or written test (second part). The requirement for passing grade is the positive grade of each part. Grade (in percentage) is formed according to the formula:
Grade(%) = 0,5 (M1 + M2)
where in percentage:
• M1, M2 – seminar essay and written test grade.</td></tr>
<tr><td rowspan="7">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>- Klarin B.: Sustainable energy – Part 1. Introduction, authorized lectures, FESB</td><td></td><td>e-learning portal</td></tr>
<tr><td>- Bajić D.: authorized lectures, FESB</td><td></td><td>e-learning portal</td></tr>
<tr><td>- Niemann, J.; Tichkiewitch, S.; Westkämper: Design of Sustainable Product Life Cycles, Springer Verlag, 2009.</td><td></td><td>book</td></tr>
<tr><td>- Fiksel, J.: A Guide to Sustainable Product Development: Eco-Efficient Product Development and Sustainable Production, Mc.Graw-Hill, 2009.</td><td></td><td>book</td></tr>
<tr><td>- Youssef, H. A., El-Hofy, H.; Machining Technology: Machine Tools and Operations, CRC Press, Taylor and Francis Group, 2008.</td><td></td><td>book</td></tr>
<tr><td>- Dixit U. S., Sarma, D. K., Paulo Davim J.; Environmentally Friendly Machining, SpringerBriefs in Applied Sciences and Technology, Springer, 2012.</td><td></td><td>book</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">- Bernard A., Tichkiewitch S.: Design of Sustainable Product Life Cycles, Springer Verlag, 2009
- Cheremisinoff, N.: Handbook of Cleaner Production, Elsevier, 2009</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- Evaluation of results in accordance with the above learning outcomes
- Feedback from students via surveys
- Self-evaluation of teachers
- Institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3">- Feedback from graduate students about the course relevance</td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="6">TECHNICAL DIAGNOSTICS</td></tr>
<tr><td>Code</td><td>FETL19</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Jani Barle, Ph. D., Full Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Stipe Perišić, Teaching assistant</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>CE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>30</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Upon completion the student will be able to critically evaluate and compare various concepts related to condition based maintenance.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Engineering maintenance</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
1. Evaluate effectiveness of technical diagnostics.
2. Differentiate relevant failure modes.
3. Comment sensor selection.
4. Compare operational and environmental conditions to acquired signals.
5. Link various concepts of signal conditioning and processing.
6. Predict residual life of a technical system.</td></tr>
<tr><td rowspan="12">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td>L hours</td><td>LE hours</td></tr>
<tr><td colspan="5">Condition monitoring, maintenance, component life prediction - pronciples and application.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Condition monitoring and diagnostics concepts. Cost effective benefits of condition monitoring. Machine life cycle.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Survey of sensing principles and damage indicators. Physical principles of sensing.</td><td>6</td><td>6</td></tr>
<tr><td colspan="5">Overview of failure mechanisms and failure modes. Time-domain and frequency-domain signatures. Parameter symptoms and limits.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Technical diagnostics with the use of temperature.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Technical diagnostics with the use of vibrations, noise and acoustic emission.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Technical diagnostics with oil and lubricant analysis. Corrosion monitoring systems.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Reliability of components and systems with diagnostic data.</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Reliability models with imperfect detection - probability of detection (POD).</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Processing and transmission of diagnostic signals (principles).</td><td>2</td><td>2</td></tr>
<tr><td colspan="5">Processing and transmission of diagnostic signals (examples).</td><td>2</td><td>2</td></tr>
<tr><td>Format of instruction</td><td colspan="2">☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="5">☐ individual assignments
☒ multimedia
☒ laboratory
☐ work with mentor
☐ individual project (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="7">Class attendance, tests, project presentation and oral exam.</td></tr>
</table>

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report	0,5	Individual work	2,0
	Essay		Seminar essay		Lab exercises	0,3
	Tests	0,2	Oral exam		(Other)	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7-week session classes and the second one is after the next 6 weeks. The first midterm is carried out as written test on basic issues covered within the first session. The second midterm is seminal paper on selected and more advanced topic. Selected topic must be discussed with respect to the course framework. The requirement for passing grade is the positive assessment on each midterm exam (>49%) or the final exam. The final score is: $Score\ (\%) = 0{,}35 \times A_1 + 0{,}35 \times A_2 + 0{,}20 \times A_3 + 0{,}10 \times A_4$ • *midterm 1:* $A_1 = 50 - 100\ \%$, • *midterm 2 (seminal paper):* $A_2 = 50 - 100\ \%$, • *oral exam:* $A_3 = 50 - 100\ \%$. • *class attendance:* $A_4 = 70 - 100\ \%$. Score — Grade 50% - 62% — sufficient (2) 63% - 76% — good (3) 77% - 88% — very good (4) 89% - 100% — excellent (5)

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	H. Czichos (Ed.), “Handbook of Technical Diagnostics: Fundamentals and Application to Structures and Systems”, Springer, 2013.		
	Fraden, J.: "Handbook of Modern Sensors", Springer, 1997.		

Optional literature (at the time of submission of study programme proposal)	Eisenmann, R.C.Sr.; Eisenmann, R.C.Jr.: "Machinery Malfunction Diagnosis and Correction: Vibration Analysis and Troubleshooting for Process Industries" Prentice Hall, 1997. Davies, A.: "Handbook of Condition Monitoring: Techniques and Methodology", Kluwer Academic Publishers, 1998. Webster, J.G.: "The Measurement, Instrumentation and Sensors Handbook" CRC Press; CD-Rom edition, 1999.
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**TECHNICAL INNOVATIONS**							
Code	FESL40	Year of study	1.					
Course teacher	Branko Klarin, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Goran Gašparović, Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective	Percentage of application of e-learning	0					

COURSE DESCRIPTION

Course objectives	Training students for: - acquire knowledge and understanding of the innovation processes, - application and analysis of procedures for the creative work of interest for technical applications, - evaluation procedures and intellectual property protection, - implement and lead the innovation process from idea to patent.
Course enrolment requirements and entry competences required for the course	English language
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - recognize the importance of innovation mainly technical, in the development of human society, - evaluate and self-evaluate of innovation potential, - recognize the importance of innovation in different technical fields, - appoint institutions and intellectual property organisations, - link and select the parameters important for innovation, - identify steps to innovate and design of project tasks, - connect various sources of ideas and design ideas, to design their own innovation, - recognize steps and design patent applications, create own patent applications.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Introduction. Etymology and basic definitions. The history and role of invention and innovation.	2	2
	Great explorers and inventors. Examples of the invention. The most significant inventions and innovations.	2	2
	Innovative potential innovators. Basics for evaluation and self-assessment.	2	2
	The implications of innovation in the research, management and policy. Indexation and the Global Innovation Index.	2	2
	Institutions and intellectual property organization.	2	2
	Basics for personal innovative work and membership in associations of innovators.	2	2
	Innovation processes and outcomes.	2	2
	Systematic innovation and design. The design spiral.	2	2
	Association, diffusion of innovation, the S-curve and other features.	2	2
	Eco-innovation and sustainability.	2	2
	Review of the EU attitude and incentives to innovation. Open innovation.	2	2
	Legal aspects of intellectual property protection and realization.	2	2
	Protected and protective symbols. Copyright, trademark,	2	2

	patent license.	
	List of laboratory or design exercises	LE or DE hours

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	3,5	Research		Practical training	
	Experimental work		Report		Individual work	
	Essay		Seminar essay	1,5	Laboratory exercises	
	Tests		Oral exam		Preparation for laboratory exercises	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of seminar essay progress. In the final exams students that did not pass the midterm exams take part. The final exams are carried out as finished seminar essay acceptance. The requirement for passing grade is the positive grade of seminar essay. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) where in percentage: • M1, M2 – seminar essay status.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	- Klarin B.: Inovacije u tehnici, autorizirana predavanja, FESB		e-learning portal
	- Von Hippel, Eric: The Sources of Innovation, Oxford University Press, 1988.		book
	- Tuomi, Ilkka: Networks of Innovation – Change and Meaning in the Age of the Internet, Oxford University Press, 2002.		book

Optional literature (at the time of submission of study programme proposal)	- Bray, D.A.; Konsynski, B.; Streator, J.: Being a Systems Innovator, National Defense University - Information Resources Management College, 2007. - Europe 2020. Flagship Initiative Innovation Union, 2010.
Quality assurance	- Evaluation of results in accordance with the above learning outcomes

methods that ensure the acquisition of exit competences	- Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	- Feedback from graduate students about the course relevance

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="7">TECHNICAL LOGISTICS</td></tr>
<tr><td>Code</td><td>FETL15</td><td>Year of study</td><td colspan="5">1.</td></tr>
<tr><td></td><td></td><td></td><td>30</td><td>0</td><td>0</td><td>15</td><td>15</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">The aim is to teach students to:
• choose type and size of warehouses
• solve transport problems
• organize and manage the integrated logistics
• improve supply chain engineering.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
• select the storage system in an industrial enterprise
• determine the surface and basic measurements of warehouses
• analyse the transport problem
• apply the available software tools to optimize the set of engineering problems
• recommend a means of transportation for the defined working conditions
• analyse the technology, organization, management and automation of storage systems
• organize integrated logistics
• manage supply chain</td></tr>
<tr><td rowspan="20">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="4">Course content</td><td colspan="2">L hours</td><td>LE hours</td></tr>
<tr><td colspan="4">Introduction and basic concepts. Historical development of logistics</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">The concept of supply chain management</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Integrated logistics</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Purpose and areas of warehouse</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Selection of number and location of warehouses. Transport problem solving. Linear programming to solve distribution problems</td><td colspan="2">2</td><td>6</td></tr>
<tr><td colspan="4">Warehouses design and construction</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Warehouses management</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">First midterm exam</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Characteristics and choice of means of transportation</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Transportation management</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">The warehouses allocation and distribution strategies</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Basics of simulation models</td><td colspan="2">1</td><td>0</td></tr>
<tr><td colspan="4">Simulation models and optimisation techniques</td><td colspan="2">2</td><td>7</td></tr>
<tr><td colspan="4">Suppliers and distributors relationship and integration</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="4">Packaging</td><td colspan="2">1</td><td>0</td></tr>
<tr><td colspan="4">Second midterm exam</td><td colspan="2">2</td><td>0</td></tr>
<tr><td colspan="6">List of laboratory exercises</td><td>DE hours</td></tr>
<tr><td colspan="6">Didactics simulation techniques</td><td>4</td></tr>
<tr><td colspan="6">Beer distribution game</td><td>4</td></tr>
</table>

	Lego simulation for inbound logistics	5
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures and exercises in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance	2	Research		Practical training	
	Experimental work		Report		Individual work	2
	Essay		Seminar essay		Laboratory exercises	1
	Tests		Oral exam		Preparation for laboratory exercises	
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	During semester there are two midterm exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. On final exams students that did not pass at least one of the midterm exams take part. Requirements for passing grade are regularly attended classes and positive assessment in exam. Positive assessment represents minimal 50% points on each midterm exam or minimal 50% points on final exam. In the third and fourth final exams students take the whole exam regardless results of midterm exams. Grade (%) = (M1+ M2) / 2 M1, M2 – average points achieved on midterm exams expressed as a percentage. Grade (%): Final mark: 50% - 61% sufficient (2) 62% - 74% good (3) 75% - 87% very good (4) 88% - 100% excellent (5)

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Gjeldum, N.: "Tehnička logistika", predavanja na e-learning portalu, FESB Split		Internet (e-learning portal)
	Bloomberg, D. J., LeMay, S., Hanna, J. B., "Logistics", Pearson education, Prentice Hall, 2002.		Internet
	Olulć, Č., "Skladištenje u industriji", u Zagrebu, Fakultet strojarstva i brodogradnje, Zagreb, 1997.	1	Internet
	Oluić, Č., "Transport u industriji", u Zagrebu, Fakultet strojarstva i brodogradnje, Zagreb, 1991.	1	Internet

Optional literature (at the time of submission of study programme proposal)	5. Simchi-Levi, D., Kaminski, P., Simchi-Levi, D., "Designing and managing the supply chain", McGraw-Hill , New York, 2000. 6. Shapiro, J. F., "Modeling the supply chain", Duxbury, Pacific Grove, 2001. 7. Dolgui, A., Proth, J. M., "Supply chain engineering: Useful methods and techniques", Springer, London 2010. 8. WEB pages
Quality assurance methods that ensure the acquisition of	- Keeping records of the attendance of students - Annual evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys

exit competences	- Self-evaluation of teachers
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**THERMAL DEVICES**							
Code	FESL25	Year of study	1.					
Course teacher	Prof. dr.sc. Sandro Nižetić Prof. dr. sc. Gojmir Radica	Credits (ECTS)	5					
Associate teachers	Dr. sc. Željko Penga	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30			
Status of the course	Elective	Percentage of application of e-learning	0					
COURSE DESCRIPTION								
Course objectives	Training students for: - understanding basic principles of different thermal devices, - analysing thermodynamic parameters.							
Course enrolment requirements and entry competences required for the course	Thermodynamics, Fluid Mechanics							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1. Identify different thermal devices; 2. Solve basic thermodynamic characteristic; 3. Analyse energy transformation in thermal devices; 4. Choose thermal device for specific system and application; 5. Determine energy balance of thermal devices; 6. Critically assess condition of thermal device.							
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours					
	Thermal devices types. Basic principles of working.	2	2					
	Thermodynamic characteristic of steam generators.	2	2					
	Application of steam generators.	2	2					
	Thermodynamic characteristic of steam turbine.	2	2					
	Steam turbine design and application.	2	2					
	Thermodynamic characteristic of gas turbine.	2	2					
	Gas turbine design and application.	2	2					
	Heat exchangers types and calculation of characteristics.	2	2					
	Main working principles and parameters of heat pumps.	2	2					
	Calculations and application of heat pumps.	2	2					
	Types and application of heat regenerators and recuperators.	2	2					
	Equipment for degassing.	2	2					

	Heat measuring devices.	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report		Individual work	2,7
	Essay		Seminar essay		(Other)	
	Tests	0,2	Oral exam		(Other)	
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam

There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests (oral test-if necessary). The requirement for passing grade is the positive assessment of exercises and 50 % points for theory and exam on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula:

$$\text{Grade}(\%) = 0,54\ (M1 + M2)$$

the activities in percentage:

- M1, M2 – test results.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Radica G. Lectures from the course of thermal devices		e-learning
	The CRC Handbook of Thermal Engineering (Mechanical Engineering), Frank Kreith, 2000	1	
	Mills, A.E. "Heat transfer", Pretince Hall, 1999.	5	

Optional literature (at the time of submission of study programme	- Woodyard , D.:Pounder's Marine Diesel Engines and Gas Turbines,UK,2009.

proposal)	
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

NAME OF THE COURSE	**THEORY OF MECHANISMS**						
Code	FESL43	Year of study	1.				
Course teacher	Željan Lozina, Ph. D., Full Professor Damir Vučina, Ph. D., Full Professor	Credits (ECTS)	5				
Associate teachers	Damir Sedlar, Ph. D., Assistant Professor Ivan Tomac, , Ph. D., Assistant Professor Igor Pehnec, , Ph. D., Assistant Professor	Type of instruction (number of hours)	L	S	AE	LE	DE
			30	0	30	0	0
Status of the course	Elective	Percentage of application of e-learning	0				
COURSE DESCRIPTION							
Course objectives	To understand the terms, types, and design related to mechanisms. To understand the working principles of common mechanisms. To perform kinematic and dynamic analysis of mechanisms.						
Course enrolment requirements and entry competences required for the course	None						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	6) Explain basic concepts of mechanisms 7) Ability to perform kinematic analysis 8) Ability to dynamic analysis 9) Ability to apply simple mechanisms such as: rotation speed regulation						

Course content broken down in detail by weekly class schedule (syllabus)

Course content	L hours	AE hours
Introduction to basic concepts. Kinematic pairs, kinematic constraints, dof	6	6
Equation of motion.	6	6
Solution of equation of motion.	6	6
Overview of mechanisms,…	2	2
Analysis in time domain..	3	3
Sensors and actuators.	3	3
Identification and control.	4	4

List of laboratory exercises	LE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work		☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)			
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.					
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report		Individual work	2,9
	Essay		Seminar essay		Laboratory exercises	0
	Tests	0	Oral exam		Preparation for laboratory exercises	0
	Written exam	0,1	Project		(Other)	
Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of 10 theoretical questions and numerical problems and final tests consist of 20 theoretical questions and numerical problems. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) the activities in percentage: • M1, M2 – midterm test results. Relative grading according Faculty and University rules.					

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Ž. Lozina: Autorizirana predavanja, FESB		e-learning portal
	Ž. Lozina i D Vučina: Teorija mehanizama, Skripta, FESB		
Optional literature (at the time of submission of study programme proposal)	P.E. Nikravesh: Planar moultibody dynamics, CRC Press, 2008. E.J.Haug: Computer-Aided Kinematics and Dynamics of Mechanical Systems, Allyn and Bacon, 1989.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	THEORY OF PLASTICITY AND VISCOELASTICITY						
Code	FESL42	Year of study	1.				
Course teacher	Vedrana Cvitanić, Ph. D., Associate Professor	Credits (ECTS)	5				
Associate teachers		Type of instruction (number of hours)	L	S	AE	LE	DE
			45	0	15	0	0
Status of the course	Elective	Percentage of application of e-learning	0				

COURSE DESCRIPTION

Course objectives	Training students for: - solving and analyzing problems of structural analysis under conditions of nonlinear (elastoplastic and viscoelastic) material behaviour, - determination of stress and strain distributions for simple loading of beam elements under conditions of nonlinear material behaviour, - understanding concepts of elastoplastic and viscoelastic constitutive models and their algorithmic formulations that are used in finite element codes for nonlinear structural analysis.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - explain characteristic of mechanical behaviour of elastoplastic materials, - compute stress and displacement distributions for elastoplastic states, limit load and residual stresses and displacements for beams under axial, torsion loading or bending loading, - compute limit load for plane beams and frames in elastoplastic states, - explain concepts and principles of elastoplastic constitutive formulations for three dimensional stress states under conditions of small strains, - explain algorithm for calculating state variables of elastoplastic process for constitutive formulations based on isotropic yield function and isotropic hardening concept, - explain characteristic of mechanical behaviour of viscoelastic materials, - explain Maxwell's viscoelastic model and Voigt-Kelvin's viscoelastic model and based on these models derive creep response and stress relaxation response, - explain solving equations of viscoelastic models by Laplace's transform, - explain solving problems of variable loading for beams by Bolzman's principle of superposition, - explain principles of viscoelastic constitutive formulations for three dimensional stress states

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	AE hours
	Introduction to theory of plasticity. Experimental data about material plastic behaviour. Effect of temperature and strain rate on material plastic behaviour. Idealizations of one dimensional plasticity diagrams. Rheological models of plasticity.	3	
	Plastic analysis of beams. Axial loading of beams in plastic region. Limit state. Elastic-perfectly	3	1

	plastic model and elastic-linear hardening model.		
	Torsion loading of beams with circular cross section in plastic region. Limit state. Elastic-perfectly plastic model and elastic-linear hardening model.	3	1
	Pure and transverse bending in plastic region. Limit state. Elastic-perfectly plastic model.	3	2
	Plastic analysis of beams and frames.	3	2
	Yielding criteria for isotropic materials: Tresca yielding criterion, von Mises yielding criterion, Drucker-Prager yielding criterion, Mohr-Coulomb yielding criterion. Yielding criteria for anisotropic materials: Hill and Karafillis-Boyce yielding criterion.	5	1
	Concepts and principles of elastoplastic constitutive formulations for three dimensional stress states under conditions of small strains. Flow rule. Isotropic and kinematic hardening models for three dimensional stress states.	3	
	Algorithms for calculating state variables of elastoplastic process.	3	1
	Examples of complex body loading in plastic state.	1	3
	Introduction to theory of viscoelasticity. Experimental data for viscoelastic materials. Creep and stress relaxation. Effect of temperature and time on viscoelastic material behaviour.	3	
	Rheological models of viscoelasticity. Maxwell's model. Voigt-Kelvin's model. Generalized models.	3	1
	Solving viscoelastic model equations. Laplace's transform. Boltzman's principle of superposition.	3	1
	Principles of visoelastic constitutive formulations for three dimensional stress states.	3	
	List of laboratory exercises		LE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures and exercises in the amount of at least 70 % of the times scheduled.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	1,7	Research		Practical training	
	Experimental work		Report		Individual work	3,0
	Essay		Seminar essay		Laboratory exercises	
	Tests	0,2	Oral exam		Preparation for laboratory exercises	
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterm exams during the semester. After semester there are two final exam terms, one corrective exam term and one exam term held by commission according to schedule. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks of lecturing. Each midterm exam is written and test consists of theoretical questions and numerical problems. The requirement for passing grade is 50% points on each midterm exam. In the final exams students that did not pass the midterm exams take part. In the additional exam terms students take whole exam.

<table>
<tr><td rowspan="1"></td><td colspan="3">Final number of points is formed according to the formula:
Points(%)= (M1 + M2)/2
M1, M2 – points on midexams.

Final grade is determined by absolute system of grading. Final grade is determed by the achived final number of points in the following manner: from 50% to 61% - grade sufficient (2), from 62% to 74% - grade good (3), from 75% to 87% - grade very good (4) and from 88% to 100% - grade excellent (5).

According to Article 71 of Faculty Statue, students are obligate to contribute in all education activities and to attend at least 70% of lecture and exercise lessons. Above conditions are necessary to access midterm and final exams.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Alfirević, I.: "Uvod u tenzore i mehaniku kontinuuma", Golden marketing, Zagreb, 2003.</td><td></td><td></td></tr>
<tr><td>Alfirević, I., Pustaić, D.: "Inženjerski priručnik IP1", poglavlje: Teorija plastičnosti, Školska knjiga, Zagreb, 1996.</td><td></td><td></td></tr>
<tr><td>Alfirević, I., Brnić, J.: "Inženjerski priručnik IP1", poglavlje: Teorija viskoelastičnosti, Školska knjiga, Zagreb, 1996.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">Khan, A. S., Huang, S., "Continuum theory of plasticity", Wiley & Sons Inc., New York, 1995.
Simo, J.C., Hughes, T.J.R., "Elastoplasticity and Viscoplasticity - Computational Aspects", Springer-Verlag, 1988.
Bathe, K.J.: "Finite element procedures in engineering analysis", Prentice-Hall, New York, 1996.
Brnić, J.:"Elastomehanika i plastomehanika", Školska knjiga, Zagreb, 1995.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">- recording student’s presence on lessons
- evaluation of results in accordance with the above learning outcomes
- feedback from students via surveys
- self-evaluation of teachers
- institutional and non-institutional evaluations</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

NAME OF THE COURSE	**THERMAL POWER PLANTS**							
Code	FESL27	Year of study	2.					
Course teacher	Gojmir Radica, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Dario Bezmalinović, Ph. D., Teaching assistant Ivan Tolj, Ph. D., Teaching assistant	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	30	0	0	
Status of the course	Elective	Percentage of application of e-learning	0					
COURSE DESCRIPTION								
Course objectives	Training students for: - understanding of complex concept and principles of thermal power plants, - development of thermal power plants - setting up and solving thermodynamic parameters of thermal power plant..							
Course enrolment requirements and entry competences required for the course	Thermodynamics, Fluid Mechanics							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - identify different thermal power plants and components, - calculate basic operating parameters of internal combustion engines and gas turbines, - analyze the energy transformation in thermal machines and its dependence on characteristics of the process, - select a thermal machine for the particular power plant based on its energy characteristics, - evaluate proper use of power plant, load, efficiency and environmental consideration.							
Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours					
	Overview of different types of power plants	2	2					
	Main components of the plant	2	2					
	Auxiliary components and systems	2	2					
	Diagrams flows of material, energy and losses	2	2					
	Power plants with steam turbines.	2	2					
	Power plants with gas turbines.	2	2					
	Power plants with IC engines on gas and heavy fuel.	2	2					
	Water supply and cooling systems. Transport and handling of fuel.	2	2					
	The economic aspect of power plants.	2	2					
	The enviromental aspect of power plants	2	2					

	Rules and technical specifications.	2	2
	New technologies implemented in power plants.	2	2
	Experts systems for monitoring, diagnostic and optimisation.	2	2
	List of laboratory or design exercises		LE or DE hours

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,5	Research		Practical training	
	Experimental work		Report		Individual work	2,7
	Essay		Seminar essay		(Other)	
	Tests	0,2	Oral exam		(Other)	
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests (oral test-if necessary). The requirement for passing grade is the positive assessment of exercises and 50 % points for theory and exam on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,54 (M1 + M2) the activities in percentage: • M1, M2 – test results.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Radica G.: Predavanja iz predmeta Toplinski strojevi		e-learning portal
	Grljušić M.:" Motori s unutrašnjim izgaranjem", Sveučilište u Splitu, FESB, 2000	5	
	Fabris O., Grljušić M.:" Kompresori", Sveučilište u Splitu, FESB, 2009.	5	
Optional literature	1.Stone R.:" Introduction to Internal Combustion Engines", University of Oxford,		

(at the time of submission of study programme proposal)	PALGRAVE, N.Y., 1999. 2.Jeras D.:" Klipni motori-uređaji", Školska knjiga, Zagreb, 1992. 3.Andrassy M.:" Kompresori", FSB, Sveučilište u Zagrebu, 2001. 4 J.H. Horlock, D.E Winterbone The Thermodynamics and gas dynamic of internal-combustion engines, , Oxford, 1986. 5. J. B. Heywood: Internal combustion engines fundamentals, McGraw-Hill, 1988
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">TOOLS AND FIXTURES</td></tr>
<tr><td>Code</td><td>FETL20</td><td>Year of study</td><td colspan="6">2</td></tr>
<tr><td>Course teacher</td><td>Branimir Lela, Ph. D.,
Assistent Professor</td><td>Credits (ECTS)</td><td colspan="6">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td colspan="2">DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td><td colspan="2">30</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="6">0%</td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:
- Learning basic knowledge on selection and design of tools and fixtures in production practice in casting, deformation and machining technologies
- Acquiring expert knowledge in design, calculation, production and implementation of tools and fixtures in production technologies</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:
- categorize tools and fixtures in production technologies
- make diagrams of loads and stresses of tools during exploitation
- select materials and standard machine elements during design tools and fixtures
- develop a tool or fixture for making products using various production technologies
- design a tool or fixture
- calculate main elements of tools and fixtures
- discuss on proposed design solutions with arguments
- determine economic feasibility of tools and fixtures application</td></tr>
<tr><td rowspan="18">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Course content</td><td>L hours</td><td>AE hours</td></tr>
<tr><td colspan="6">Introduction; Basic concepts and definition of tools</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tools for casting</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tools for cold forming</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tools for forging</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tools for hot extrusion</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tools for rolling</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tools for sheet metal processing</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">First midterm exam</td><td></td><td></td></tr>
<tr><td colspan="6">Tools for machining processes</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Basic concepts and definition of fixtures</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Guidelines for fixtures design</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Tolerances and position of the workpiece in fixtures</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Elements fixtures and design of fixtures</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Developing of fixtures and determining the price of fixtures</td><td>2</td><td>/</td></tr>
<tr><td colspan="6">Second midterm exam</td><td></td><td></td></tr>
<tr><td colspan="7">List of design exercises</td><td>DE hours</td></tr>
<tr><td colspan="7">Each student get an assignment to design a tool or fixture that must be resolved during the semester. Design exercises are held two hours a week where students receive instructions for solving their assignments in</td><td>30</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">the design sense.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☒ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Presence at the lectures at least 70% and at the laboratory exercise 100% of the time scheduled. Preparation and submission of seminar work.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Individual work</td><td>2</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>2</td><td>Laboratory exercises</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">During the semester there are two midterms and final exams. First midterm exam is after 7 weeks and the second is after 15 weeks of lectures. On final exams students take the exam of those parts of the course content that are not passed on midterms.
Every student gets an assignment in design that have to be completed during the semester.
The requirements for a positive grade are 50% points on each midterm and positive grade from seminar work.

Grade is forming in accordance with the following formula:
Grade (%)=M1/4 + M2/4+PG/2
or
Grade (%)=ZI/2+PG/2
M1, M2 – score on midterms in percentage (%)
PG – seminar work grade (%)
ZI – score on final exam (%)
Grading policy:
Percentage Grade
50% do 61% sufficient (2)
62% do 74% good (3)
75% do 87% very good (4)
88% do 100% excellent (5)
Students who do not pass midterms attend regularly scheduled final exam which has written and oral part.
Students whose seminar work is rated at least very good (4) may on midterms and final exam score less than 50% but not less than 25%. In that case final score of the course is a grade obtained on seminar work.

Examination terms: according to the timetable</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">Duplančić, I., Lela, B., "Alati i naprave", autorizirana predavanja, FESB</td><td></td><td>e-learning portal</td></tr>
<tr><td colspan="4">Magdić, S. Rebec, B., "Štance I i II", Sveučilište u Zagrebu, Zagreb 1968.</td><td></td><td></td></tr>
<tr><td colspan="4">Rebec, B., "Naprave", Sveučilište u Zagrebu, Zagreb 1972.</td><td></td><td></td></tr>
</table>

	Grizelj, B., "Alati i naprave" , Sveučilište u Osijeku, Slavonski Brod, 2004.		
Optional literature (at the time of submission of study programme proposal)	– Boljanovic, V., Paquin, J.R., Crowley, R.E., "DieDesign Fundamentals", IndustrialPressInc., 2005. – Čuš F., "Vpenjalne priprave za procese odrezavanja", Univerza u Mariboru, Maribor, 2004.		
Quality assurance methods that ensure the acquisition of exit competences	- Keeping records of class attendance - Evaluation of results in accordance with the learning outcomes - Feedback from students via surveys - Self-evaluation of teachers		
Other (as the proposer wishes to add)			

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="6">TRANSPORT IN INDUSTRY</td></tr>
<tr><td>Code</td><td>FESL06</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Tonči Piršić, Ph. D., Associate Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td>DE</td></tr>
<tr><td>30</td><td>0</td><td>0</td><td>0</td><td>30</td></tr>
<tr><td>Status of the course</td><td>Obligatory</td><td>Percentage of application of e-learning</td><td colspan="5">40%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students for:
-</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Technical Drawings, Mechanics, Strength of Materials, Machine Elements</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">Students will be able to:
- Ability of designing the transport systems in industry.</td></tr>
</table>

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L or S hours	AE hours
	Division of transportation systems due to working principle and transported material.	2	
	Purpose and working area of transportation systems.	3	
	Maintenance cost. Material properties and choice of transportation system.	3	
	Mechanical transport with pulling elements.	2	
	Mechanical transport without pulling elements.	2	
	Cranes.	8	
	Conveyors.	2	
	Elevators. Lifts. Scrappers.	2	
	Gravity transporters.	2	
	Hydraulic transport. Pneumatic transport. Pressure vessels.	2	
	List of laboratory or design exercises		LE or DE hours
	Construction and modelling of crane driving winch		28

Format of instruction		
	☒ lectures ☐ seminars and workshops ☒exercises ☐ *on line* in entirety	☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor

<table>
<tr><td></td><td colspan="3">☐ partial e-learning
☐ field work</td><td colspan="3">☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The presence on lectures in the amount of at least 70 % of the times scheduled.
Performed all required laboratory exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>2</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">1. T. Piršić: "Transport u industriji", FESB – Split, 2005.</td><td></td><td></td></tr>
<tr><td colspan="4">2. J. Serdar: "Prenosila i dizala", Tehnička knjiga, Zagreb, 1983.</td><td></td><td></td></tr>
<tr><td colspan="4">3. H. I. Shapiro, J. P. Shapiro, L. K. Shapiro: "Cranes and Dericks", McGraw – Hill Professional, 1999.</td><td></td><td></td></tr>
<tr><td colspan="4">4. D. Šćap: "Prenosila i dizala, podloge za konstrukciju i proračun", Sveučilišna naklada Liber, Zagreb, 1988.</td><td></td><td></td></tr>
<tr><td colspan="4">5. Tehnička enciklopedija, 6. tom, Leksikografski zavod Miroslav Krleža, Zagreb, 1988.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">1. S. Dedijer: "Osnovi transportnih uređaja", Građevinska knjiga, Beograd, 1978.
2. M. A. Alspaugh, R. O. Bailey: "Bulk Material Handling by Conveyor Belt",
Society for Mining Metalurgy & Exploration, 1996.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">- Lectures responsible for the same subject area collaborate closely and monitor each other's work. Occassional class observations and appraisal by Head of Department</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="8">VEHICLE DYNAMICS</td></tr>
<tr><td>Code</td><td>FESL48</td><td>Year of study</td><td colspan="6">2</td></tr>
<tr><td>Course teacher</td><td>Prof. dr.sc. Željan Lozina</td><td>Credits (ECTS)</td><td colspan="6">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Doc.dr.sc. D. Sedlar
Doc. dr.sc. I. Tomac</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>AE</td><td>LE</td><td colspan="2">DE</td></tr>
<tr><td>30</td><td></td><td>15</td><td>15</td><td colspan="2"></td></tr>
<tr><td>Status of the course</td><td>elective</td><td>Percentage of application of e-learning</td><td colspan="6">0</td></tr>
<tr><td colspan="9">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="8">Training students for:
- basics of vehicle dynamics</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="8">None</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="8">Students will be able to:
- performe simple longitudinal dynamics analysis
- performe simple lateral dynamics analysis
- analyse simple verical vehicle dynamics
- analyse vehicle motion stability</td></tr>
<tr><td rowspan="23">Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Course content</td><td colspan="2">L or S hours</td><td>AE hours</td></tr>
<tr><td colspan="5">Description and technical characteristics of vehicle motor</td><td colspan="2">2</td><td>2+0</td></tr>
<tr><td colspan="5">Introduction in drive dynamics</td><td colspan="2">4</td><td>2+2</td></tr>
<tr><td colspan="5">Mechanics of wheels and tires</td><td colspan="2">4</td><td>2+2</td></tr>
<tr><td colspan="5">Longitudinal dynamics (distribution of load during acceleration and breaking)</td><td colspan="2">4</td><td>2+2</td></tr>
<tr><td colspan="5">Lateral dynamics of vehicle (stability and control)</td><td colspan="2">4</td><td>2+2</td></tr>
<tr><td colspan="5">Vertical dynamics and comfort</td><td colspan="2">4</td><td>2+2</td></tr>
<tr><td colspan="5">Noise inside vehicle and environmental noise.</td><td colspan="2">4</td><td>2+2</td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="2"></td><td></td></tr>
<tr><td colspan="7">List of laboratory or design exercises</td><td>LE or DE hours</td></tr>
<tr><td colspan="7">Projects in selected topics</td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td colspan="7"></td><td></td></tr>
<tr><td>Format of instruction</td><td colspan="2">x lectures
☐ seminars and workshops
x exercises
☐ on line in entirety
☐ partial e-learning</td><td colspan="6">☐ independent assignments
☐ multimedia
☐ laboratory
x work with mentor
☐ (other)</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">☐ field work</td><td colspan="3"></td></tr>
<tr><td>Student responsibilities</td><td colspan="6"></td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6"></td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="4">T.D. Gillespie: Fundamentals of vehicle dynamics, SoAE inc.</td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">R.N. Jazar: Vehicle Dynamics, Springer, 2014.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">-</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

NAME OF THE COURSE	VIBRATION							
Code	FESL13	Year of study	1.					
Course teacher	Željan Lozina, Ph. D., Full Professor	Credits (ECTS)	5					
Associate teachers	Damir Sedlar, Ph. D. Assistant Professor Ivan Tomac, Ph. D. Assistant Professor	Type of instruction (number of hours)	L	S	AE	LE	DE	
			30	0	0	30	0	
Status of the course	Elective	Percentage of application of e-learning	0					

COURSE DESCRIPTION	
Course objectives	To teach underlying physics phenomena of vibration and of the origin of sound and wave propagation, and the measurement of sound and vibration. To lay a solid foundation for further study in all major aspects of vibration and noise control and sound engineering.
Course enrolment requirements and entry competences required for the course	None
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	10) Ability to construct a Free Body Diagram and write the equations of motion for arbitrary linear single-degree-of-freedom systems 11) Ability to analytically solve the equations of motion for free vibrations and analyze the resulting harmonic motion 12) Ability to analytically solve the equations of motion for harmonic, general periodic and aperiodic forces. 13) Understanding of the concepts of resonance, self excited vibrations and motion and force transmission in SDOF systems. 14) Ability to solve numerically for the motion of a SDOF system under arbitrary loading using scripts (e.g. MATLAB). 15) Understanding of the basic principles of vibration isolation and absorption and ability to apply them to the design of mechanical systems such as automotive suspensions. 16) Awareness of modeling and analysis methods for linear systems with more than 1 DOF 17) Ability to construct Free Body Diagrams and write the equations of motion for two degree of freedom systems. Ability to describe eigenvalues and eigenvectors (for two degree of freedom systems) and how they are used in engineering analysis.

Course content broken down in detail by weekly class schedule (syllabus)	Course content	L hours	AE hours
	Introduction to Vibration concepts. Free vibration of single degree of freedom mechanical system: undamped and viscously damped.	3	1
	Forced vibration (harmonic excitation) of single degree of freedom mechanical system.	3	2
	Other types of damping (nonviscous) Transformation approach, Transfer function.	3	1
	Other types of excitation: Periodic, pseudoperiodic, unperiodic, stochastic,…	3	1
	Transmissibility.	3	1
	Unbalance excitation and introduction to rotor dynamics.	3	1

	Rotor dynamics: plain, symmetric, viscously damped.	3	1
	First midterm exam		
	Vibration of the two degrees of freedom systems. Dynamic absorber.	3	1
	Vibration of continuous systems: axial and transversal vibration of bars.	3	1
	Finite element implementation in analysis of vibration	3	1
	Introduction to nonlinear vibration.	3	1
	Measuring of vibration.	3	1
	Noise and vibration isolation principles..	3	1
	Second midterm exam		
	List of laboratory exercises		LE hours
	Natural frequency. Natural form.		2
	Resonance. Transmissibility.		2
	Damping, Modal damping, Logarithmic decrement.		2
	Transfer function in time and frequency.		2
	Programming and simulation of vibration.		4

Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☐ independent assignments ☒ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.	

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	2,0	Research		Practical training	
	Experimental work		Report		Individual work	2,9
	Essay		Seminar essay		Laboratory exercises	0
	Tests		Oral exam		Preparation for laboratory exercises	0
	Written exam	0,1	Project		(Other)	

Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm test consists of 10 theoretical questions and numerical problems and final tests consist of 20 theoretical questions and numerical problems. In the final exams students that did not pass the midterm exams take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is 50 % points on each midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) the activities in percentage: • M1, M2 – midterm test results. Relative grading according Faculty and University rules.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Ž. Lozina: Autorizirana predavanja, FESB		e-learning portal

Optional literature (at the time of submission of study programme proposal)	L. Meirovitch: Fundamentals of vibration, McGraw-Hill, 2001 B.H. Tongue: Principles of vibration, Oxford University press, 1996.		
Quality assurance methods that ensure the acquisition of exit competences	- Evaluation of results in accordance with the above learning outcomes - Feedback from students via surveys - Self-evaluation of teachers - Institutional and non-institutional evaluations		
Other (as the proposer wishes to add)			

3. STUDY PERFORMANCE CONDITIONS

3.1. Places of the study performance

Buildings of the constituent part (name existing, under construction and planned buildings)	
Identification of building	FESB
Location of building	R. Boškovića 32
Year of completion	1980. phase 1, 2008. phase 2
Total square area in m^2	29.477

3.2. List of teachers and associate teachers

Course	Teachers and associate teachers
Aerotechnics and wind turbines	Branko Klarin, Ph. D., Full Professor Goran Gašparović, Teaching assistant
Cogeneration power plant optimization	Gojmir Radica, Ph. D., Full Professor Dario Bezmalinović, Ph. D., Teaching assistant Ivan Tolj, Ph. D., Teaching assistant
Computer aided design 1	Gojko Magazinović, Ph. D., Full Professor Ivan Pivac, Teaching assistant
Computer aided design 2	Gojko Magazinović, Ph. D., Full Professor Ivan Pivac, Teaching assistant
Computer aided manufacturing	Dražen Bajić, Ph. D, Full Professor Sonja Jozić, PhD, Assistant Professor Mario Veić, Teaching assistant
Computer networks	Julije Ožegović, Ph. D, Full Professor Vesna Pekić, Ph. D., Teaching assistant Ante Kristic, Ph. D., Teaching assistant
Databases	Vladan Papić, Ph. D., Full Professor Tea Marasović, Ph. D., Teaching assistant
Design & projecting of aluminium structures	Miro Bugarin, PhD, Assistant Professor Željko Domazet, Ph. D., Full Professor
Design for assembly	Nikola Gjeldum, Ph. D., Assistant Professor Marina Crnjac, Teaching assistant Ivan Peko, Teaching assistant
Economic treatment of materials	Nedjeljko Mišina, Ph. D., Full Professor
Electrical drives	Božo Terzić, Ph. D., Full Professor Marin Despalatović, Ph. D., Associate Professor Goran Majić, Ph. D., Teaching assistant
Energy efficiency in buildings	Nižetić Sandro, Ph. D., Associate Professor Ivan Tolj, Ph. D., Teaching assistant Dario Bezmalinović, Ph. D., Teaching assistant
Engineering design	Tonči Piršić, Ph. D., Asociate Professor
Engineering maintenance	Jani Barle, Ph. D., Full Professor Stipe Perišić, Teaching assistant
Engines and vehicles	Željan Lozina, Ph. D., Full Professor Gojimir Radica, Ph. D., Full Professor Nikola Matulić, Teaching assistant

English language for academic purposes	Daniela Matić, Ph.D., Assistant Professor
Evaluation of industrial projects	Damir Vučina, Ph. D., Full Professor, Željan Lozina, Ph. D., Full Professor Marija Šiško Kuliš, Ph. D., Associate Professor Igor Pehnec, Ph. D., Teaching assistant
Fatigue strength of materials	Željko Domazet, Ph. D., Full Professor Lovre Krstulović-Opara, Ph. D., Full Professor Petra Bagavac, Teaching assistant
Finite element method	Željan Lozina, Ph. D., Full Professor Damir Sedlar, Ph. D., Assistant Professor Ivan Tomac, Ph. D., Assistant Professor
Fluid flow	Zoran Milas, Ph. D., Associate Professor
Fuel cells	Frano Barbir, Ph. D., Full Professor Ivan Tolj, Ph. D., Teaching assistant
Heat and mass transfer	Frano Barbir, Ph. D., Full Professor Dario Bezmalinović, Ph. D., Teaching assistant
Heat treatment and surface protection	Dražen Živković, Ph. D., Full Professor Zvonimir Dadić, Teaching assistant
Heating and air conditioning	Nižetić Sandro, Ph. D., Associate Professor Ivan Tolj, Ph. D., Teaching assistant Dario Bezmalinović, Ph. D., Teaching assistant
Hybrid energy systems	Branko Klarin, Ph. D., Full Professor Goran Gašparović, Teaching assistant
Hydraulic and pneumatic systems	Jani Barle, Ph. D., Full Professor Alen Kovač, Teaching assistant
Industrial electronics	Tihomir Betti, Ph. D., Assistant Professor Ivan Marasović, Ph. D., Assistant Professor
Introduction to fracture mechanics	Srdjan Podrug, Ph.D., Associate professor
Introduction to information systems	Damir Vučina, Ph. D. Full Professor Igor Pehnec, Ph. D. Teaching assistant Ivo Marinić- Kragić, Teaching assistant Milan Ćurković, Ph. D., Teaching assistant
Machine tools	Dražen Bajić, Ph. D., Full Professor Sonja Jozić, Ph. D., Assistant Professor Mario Veić, Teaching assistant
Manufacturing process planning	Nikola Gjeldum, Ph. D., Assistant Professor Marina Crnjac, Teaching assistant
Materials 3	Nikša Krnić, , Ph. D., Associate Professor
Materials Weldability	Nedjeljko Mišina, , Ph. D., Full Professor
Mathematics – special topics	Ivan Slapničar, Ph.D., Full Professor Lana Periša, Teaching assistant Anita Carević, Teaching assistant
Measurement And Experimental Analysis Of Vibration	Željan Lozina, Ph. D., Full Professor Damir Sedlar, Ph. D., Assistant Professor Tomac Ivan, Ph. D., Assistant Professor
Mechanical drives	Srdjan Podrug, Ph. D., Associate Professor
Mechanics of materials 3	Frane Vlak, Ph. D., Associate Professor Marko Vukasović, Ph. D., Teaching assistant

Metal structures design	Željko Domazet, Ph.D., Full Professor, Lovre Krstulović-Opara, Ph.D., Full Professor Miro Bugarin, Ph.D.,Teaching assistant
Modeling and optimization of technological processes	Branimir Lela, Ph.D., Assistant Professor Sonja Jozić, Ph.D., Assistant Professor
Nonconventional machining processes	Sonja Jozić, Ph.D.,Assistant Professor
Numerical synthesis in engineering	Damir Vučina, Ph. D., Full Professor Igor Pehnec, Ph. D., Teaching assistant
Optimization methods	Damir Vučina, Ph. D., Full Professor Igor Pehnec, Ph. D., Teaching assistant, Ivo Marinić- Kragić, Teaching assistant
Plant layout	Ivica Veža, Ph. D., Full Professor Marko Mladineo, Ph. D., Teaching assistant
Power system operation and control	Elis Sutlović, Ph. D., Full Professor Ivan Vjeko Tomić, Teaching assistant
Product development and management	Lovre Krstulović-Opara, Ph. D., Full Professor
Production management	Ivica Veža, Ph. D., Full Professor Marko Mladineo, Ph. D., Teaching assistant
Production planning and control	Boženko Bilić, Ph.D. Full Professor Marko Mladineo, Ph. D., Teaching assistant
Quality Assurance	Boženko Bilić, Ph.D. Full Professor Marko Mladineo, Ph.D., Teaching assistant
Refrigeration	Nižetić Sandro, Ph. D., Associate Professor Ivan Tolj, Ph. D., Teaching assistant Dario Bezmalinović, Ph. D., Teaching assistant
Renewable energy sources and sustainable development	Frano Barbir, Ph. D., Full Professor Dario Bezmalinović, Ph. D., Teaching assistant
Robotics	Mojmil Cecić, Ph. D., Full Professor Stanko Kružić, Teaching assistant
Ship propulsion system	Gojmir Radica, Ph. D., Full Professor Dario Bezmalinović, Ph. D., Teaching assistant Ivan Tolj, Ph. D.,Teaching assistant Tino Sumić, Teaching assistant
Statistics	Ante Rozga, Ph. D., Full Professor
Sustainable production	Dražen Bajić, Ph. D., Full Professor Branko Klarin, Ph. D., Full Professor Sonja Jozić, Ph. D., Assistant Professor Mario Veić, Teaching assistant
Technical diagnostics	Jani Barle, Ph. D., Full Professor Stipe Perišić, Teaching assistant
Technical innovations	Branko Klarin, Ph. D., Full Professor Goran Gašparović, Teaching assistant
Technical logistics	Nikola Gjeldum, Ph. D., Assistant Professor Marina Crnjac, Teaching assistant Ivan Peko, Teaching assistant
Thermal devices	Sandro Nižetić, Ph. D., Associate Professor Gojmir Radica, Ph. D., Full Professor Željko Penga, Ph.D.
Theory of mechanisms	Željan Lozina, Ph. D., Full Professor Damir Vučina, Ph. D., Full Professor Damir Sedlar, Ph. D., Assistant Professor Ivan Tomac, , Ph. D., Assistant Professor

	Igor Pehnec, , Ph. D., Assistant Professor
Theory of plasticity and viscoelasticity	Vedrana Cvitanić, Ph. D., Associate Professor
Thermal power plants	Gojmir Radica, Ph. D., Full Professor Dario Bezmalinović, Ph. D., Teaching assistant Ivan Tolj, Ph. D., Teaching assistant
Tools and fixtures	Branimir Lela, Ph. D., Assistent Professor
Transport in industry	Tonči Piršić, Ph. D., Associate Professor
Vehicle dynamics	Željan Lozina, Ph. D., Full Professor Damir Sedlar, Ph. D. Assistant Professor Ivan Tomac, Ph. D. Assistant Professor
Vibration	Željan Lozina, Ph. D., Full Professor Damir Sedlar, Ph. D. Assistant Professor Ivan Tomac, Ph. D. Assistant Professor

3.3. Curriculum vitae of the course teacher

First and last name and title of teacher	**Dražen Bajić, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Computer aided manufacturing
GENERAL INFORMATION ON COURSE TEACHER	
Address	Julija Klovića 16 B, 21000 Split
Telephone number	091 430 59 31
E-mail address	dbajic@fesb.hr
Personal web page	
Year of birth	1965.
Scientist ID	186 194
Research or art rank, and date of last rank appointment	Scientific Adviser, 12/4/2006
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 25/1/2013
Area and field of election into research or art rank	Technical Sciences, Mechanical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	15/7/1991
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Manufacturing engineering, machining, machine tools
Function	Head of Chair of Mechanical Engineering Technology
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture
Place	Zagreb
Date	17/4/2000
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	

COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	**Undergraduate study:** 1. Technology 2 (150) 2. Technology 2 (130) **Graduate study:** 1. Machine tools (261, 263) 2. Machine tools and systems (270) 3. Sustainable production (272) **Professional study:** 1. Machining and machine tools (530) 2. Computer aided manufacturing (530) 3. Manufacturing processes (540) **Postgraduate study:** 1. Modern machining processes (330) 2. Rapid manufacturing (330)
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Jozić, Sonja; Bajić, Dražen; Celent, Luka. Application of compressed cold air cooling: achieving multiple performance characteristics in end milling process. // Journal of cleaner production. 100 (2015) , /; 325-332 2. Jozić, Sonja; Bajić, Dražen; Stoić, Antun. *Flank wear and surface roughness in end milling of hardened steel* // Metalurgija. 54 (2015), 2; 343-346. 3. Jozić, Sonja; Lela, Branimir; Bajić, Dražen. A New Mathematical Model for Flank Wear Prediction Using Functional Data Analysis Methodology. // Advances in Materials Science and Engineering. 2014 (2014) ; 1-8 4. Jozić, Sonja; Bajić, Dražen; Samardzić, Ivan. Contribution to the assessment of economic viability of hard milling process. Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku (1330-3651) 21 (2014), 6; 1329-1336. 5. Bajić, Dražen; Celent Luka; Jozić, Sonja. *Modeling of the influence of cutting parameters of the surface roughness, tool wear and cutting force in face milling in off-line process control*. // Strojniški vestnik – Journal of Mechanical Engineering. 58 (2012), 11; 673-682
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	- Bajić, D., Celent, L., Jozić, S., Design and 3D printing of bottles for designing of bottling plant, (Ordered by: Viloet Logistics Ltd., Obrež Zelinski), Split, 2013. - Bajić, D., Celent, L., Jozić, S., Design and manufacture of molds for steering of student formula (Ordered by: UPS, Split), Split, 2012 - Bajić (PL), I. Veža, B. Bilić, S. Jozić, L. Celent, N. Koboević. High speed machining research, Ministry of science, education and sport, Croatia, - 2012
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške	

kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	- Gold medal and plaque for innovation "Planning and optimization of manufacturing system by using simulation" at the Spring Exhibition of Inventions INOVA'95 Zagreb, 1995. - Jubilee plaques and medals Croatian Association of Production Engineering for outstanding contribution to the work of HUPS's, and for the benefit of scientific and economic development of the Republic of Croatia, Zagreb, 2000. - Gold Medal Croatian Association of Production Engineering for Outstanding Contribution to the work of HUPS's, and for the benefit of scientific and economic development of the Republic of Croatia, Zagreb, 2003. - Gold Medal Croatian Association of Production Engineering for Outstanding Contribution to the work of HUPS's, and for the benefit of scientific and economic development of the Republic of Croatia, Zagreb, 2005
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Frano Barbir, Ph. D., Full Professor**
The courses he/she teaches in the proposed study programme	Heat and Mass Transfer Renewable Energy Sources and Sustainable Development Fuel Cells
GENERAL INFORMATION ON COURSE TEACHER	
Address	R. Boskovica 32
Telephone number	+385 21 305 953
E-mail address	fbarbir@fesb.hr
Personal web page	www.fesb.hr/~fbarbir
Year of birth	1954
Scientist ID	124283
Research or art rank, and date of last rank appointment	Scientific advisor, 05.07.2006.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full tenured professor 26.09.2011.
Area and field of election into research or art rank	Area of technical sciences, field mechanical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split
Date of employment	01.10.2006
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Thermodynamics, Renewable energy sources, hydrogen technologies
Function	Chair of Thermodynamics, Thermo-technics and heat engines
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD in Mechanical Engineering
Institution	University of Miami
Place	Coral Gables, FL, SAD
Date	18. December 1992.
INFORMATION ON ADDITIONAL TRAINING	
Year	1995
Place	Cleveland
Institution	Case Western Reserve University
Field of training	Electrochemical measurements
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English – 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian – 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Special Topics in Mechanical Engineering: Fuel Cells Engineering, University of Connecticut (2002 - 2005) diplomski i poslijediplomski studij 2. Special Topics in Mechanical Engineering: Fuel Cells Modeling, University of Wyoming (2012 - 2013) diplomski i poslijediplomski studij

Authorship of university/faculty textbooks in the field of the course	1. F. Barbir, PEM Fuel Cells: Theory and Practice, 2nd edition, Elsevier/Academic Press, Burlington, 2013.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. D. Bezmalinović, B. Šimić, F. Barbir, Characterization of PEM fuel cell degradation by polarization change curves, *Journal of Power Sources*, Vol. 294, (2015) pp. 82-87 2. E. Özden, I. Tolj, F. Barbir, Designing heat exchanger with variable surface area for passive cooling of PEM fuel cell, J. Appl. Thermal Eng., Vol. 51, No. 1–2, (2013), pp. 1339-1344 3. D. Bezmalinovic, F.Barbir I. Tolj, Techno-economic analysis of PEM fuel cells role in photovoltaic-based systems for the remote base stations, Int. J. Hydrogen Energy, Vol. 38, No. 1, (2013) pp. 417-425. 4. I. Tolj, D. Bezmalinovic, F.Barbir, Maintaining desired level of relative humidity throughout a fuel cell with spatially variable heat removal rates, Int. Journal Hydrogen Energy, Vol. 36, No. 20, (2011) pp. 13105-13113. 5. O. Atlam, F. Barbir, D. Bezmalinovic, A Method for Optimal Sizing of an Electrolyzer Directly Connected to a PV Module, International Journal of Hydrogen Energy Vol. 36, No. 12, (2011) pp. 7012-7018.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	• Project Leader, R&D of Hydrogen Energy System in Conjunction with Renewable Energy Sources, European Regional Development Fund through Central Agency for Contracting and Financing of EU projects (2014-2016) • Project Leader, Water and Heat Management and Durability of PEM Fuel Cells), Croatian Science Foundation, 2015-2018 • Work Package Leader: System Automation of PEMFCs with Prognostics and Health management for Improved Reliability and Economy (SAPPHIRE), project leader: SINTEF, Norway, project financed by EC FCH Joint Undertaking, (FCH-JU), 2013-2016 • Work Package Leader: Development of Guidance Manual for LCA Application to Fuel Cells and Hydrogen Technologies, H2FC-LCA HyGuide, Project Leader: ENEA Italy, project financed by EC EC FCH Joint Undertaking, (FCH-JU), 2010-2011 • Project Leader: Passive fuel cells with oxygen supply from air by natural convection, Ministry of Science, Education and Sports, 2007-2013
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	„Training for teachers and administrative staff“ as a part of EU project ME4CatalOgue (Mechanical Engineering for Catalogue) 2013-2015
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	• National annual award for science in technical sciences, 2012 • University of Split plaque for exceptional contribution to

	University development through outstanding scientific, teaching and professional work, 2012
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	• FESB, Heat and Mass Transfer, 4.5/5 • University of Wyoming, Excellent, No grades- descriptive evaluation, Fuel Cell Engineering course, 2012,

First and last name and title of teacher	**Jani Barle, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	- Engineering maintenance (FETL04) - Hydraulic and pneumatic systems (FETL17) - Technical diagnostics (FETL19)
GENERAL INFORMATION ON COURSE TEACHER	
Address	Žnjanska 4, 21000 Split, HR a
Telephone number	+385 (21) 305930
E-mail address	Jani.Barle@fesb.hr
Personal web page	https://nastava.fesb.hr/nastava/nastavnici/detalji/barle
Year of birth	1964
Scientist ID	186172
Research or art rank, and date of last rank appointment	Scientific Adviser, May 2011.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, September 2016.
Area and field of election into research or art rank	Mechanical engineering, mechanical construction engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	July 1991.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Process Automation, System Maintenance Management
Function	Education and research
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture
Place	HR - Zagreb
Date	January 1998.
INFORMATION ON ADDITIONAL TRAINING	
Year	1996.
Place	IT - Padua
Institution	Dipartimento di Ingegneria Meccanica
Field of training	Research on experimental methods
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English - 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German - 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian - 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme	On Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture

where it is/was offered, and level of study programme)	Undergraduate study: - Industrial process control (FETC06) Master's degree study: - Product life management (FETM06) Doctorate degree study: - Experimental methods (FETU24) - Reliability engineering (FETU14)
Authorship of university/faculty textbooks in the field of the course	Barle, J.: Hydraulics and pneumatics, (student handbook and workbook in Croatian: *Hidraulika i pneumatika*), FESB, Split, 2010. Barle, J.: Reliability in maintenance management, (student handbook in Croatian: *Pouzdanost u funkciji održavanja tehničkih sustava*), FESB, Split, 2009
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Barle, Jani; Đukić, Predrag; Ban, Dario. Verification of Number of Cycles for Fatique Life Estimation of Wind-Sensitive Structures // 7th ICCSM / Croatian Society of Mechanics, 2012. 233-234. 2. Barle, Jani; Wolf, Hinko; Đukić, Predrag. Experimental verification of the dynamic model for a wind turbine tower // 30th Danubia-Adria: Symposium on Advances in Experimental Mechanics / Croatian Society of Mechanics, 2013. 219-220 3. Grubišić, Vatroslav; Barle, Jani. Procedure for the Service Strength Approval of the Drillship Derricks. // Rad Hrvatske akademije znanosti i umjetnosti. Tehničke znanosti. 521 (2015), 17; 51-62. 4. Đukić, Predrag; Wolf, Hinko; Jani, Barle. Simple dynamic model of wind turbine tower with experimental verification. // International journal for engineering modelling. 28 (2015) , 1-4; 49-59
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	1. Barle, Jani; Franulović, Marina; Jurčević Lulić, Tanja; Kladarić, Ivica; Markučič, Damir; Radica, Gojmir. *Izrada kataloga znanja, vještina i kompetencija za studije strojarstva u Republici Hrvatskoj* // Zbornik radova međunarodne stručne konferencije ME4CataLOgue / Kozak, D., Barle, J., Markučič, D., Pavletić, D., Matičević, G, Vranešević M. N., Rosandić, Ž, Damjanović, D. (ur.)., Sl.Brod 2015. 2. "*Hrvatski katalog znanja, vještina i kompetencija za studije strojarstva zasnovan na ishodima učenja (za preddiplomski, diplomski i doktorski studij)*", Strojarski fakultet u Slavonskom Brodu Sveučilišta J. J. Strossmayera u Osijeku, 2015., Kozak, D., Barle, J., Boras, I., Franulović,, M., Jurčević-Lulić, T., Kladarić, I., Lelas, D., Markučić, D., Matičević, G., Pavletić, D., Vranešević-Marinić, N.(ur.), ISBN 978-953-6048-78-6
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	IPA IV project ME4CataLOgue "Further development and implementation of the Croatian Qualifications Framework (CQF)", 2013-2015.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and	

scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Tihomir Betti, Ph. D., Assistant Professor**
The course he/she teaches in the proposed study programme	Industrial Electronics
GENERAL INFORMATION ON COURSE TEACHER	
Address	Kaštelanska 2, HR-21000, Split
Telephone number	091 4305 889
E-mail address	betti@fesb.hr
Personal web page	
Year of birth	1977
Scientist ID	248722
Research or art rank, and date of last rank appointment	Assistant research fellow, 22.11.2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, 18.09.2013.
Area and field of election into research or art rank	Technical sciences, electrical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	08.06.2001.
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Electronics, Nanoelectronics, Photovoltaics
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	04.12.2009.
INFORMATION ON ADDITIONAL TRAINING	
Year	2013. (7 weeks)
Place	Freiburg, Germany
Institution	Fraunhofer ISE
Field of training	Photovoltaics
Year	2011. (3 weeks)
Place	Ljubljana, Slovenia
Institution	Institute „Jožef Stefan“
Field of training	Hybrid polymer solar cells
Year	2007-2009. (several visits, 4 weeks in total)
Place	Munich, Germany
Institution	Walter Schottky Institute
Field of training	Application of semiconductor nanostructures in third generation photovoltaics
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 2
COMPETENCES FOR THE COURSE	

Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Programmable logic controllers, Graduate study of Control Engineering and Automation, Optoelectronics, Graduate study of Electronic and Computer Engineering Solar cells, Graduate study of Electronic and Computer Engineering and Control Engineering and Automation
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. I. Marasović, Ž. Milanović, T. Betti, "Resistance Fluctuations in GaAs Nanowire Grids", Journal of Nanomaterials, (2014), 428390 2. I. Marasović, T. Garma, T. Betti, "Modelling a nanowire grid for light-sensing applications", Journal of Physics D: Applied Physics 45 (2012)
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Boženko Bilić, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Production Planning and Control
GENERAL INFORMATION ON COURSE TEACHER	
Address	Makarska ulica 2, 21000 Split, HR
Telephone number	+385 21 410 810
E-mail address	bbilic@fesb.hr
Personal web page	
Year of birth	1962.
Scientist ID	154905
Research or art rank, and date of last rank appointment	Scientific Adviser, 12/04/2006
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 25/01/2013
Area and field of election into research or art rank	Technical Sciences, Field Mechanical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	1/10/1987
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Production engineering and organization of production
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	30/6/2000
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Germany (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	Vast experience in teaching these courses.

study programme)	
Authorship of university/faculty textbooks in the field of the course	1. Bilić, B., *Kvaliteta – Planiranje, analiza i upravljanje* (sveučilišni udžbenik, ISBN 978-953-290-058-3), Sveučilište u Splitu, Fakultet elektrotehnike, strojarstva i brodogradnje, Split, 2016. 2. Veža, I., Bilić, B., Gjeldum, N., Mladineo, M., *Upravljanje projektima* (interna skripta, ISBN 978-953-290-030-9), Fakultet elektrotehnike, strojarstva i brodogradnje, Split, 2011. 3. Veža, I., Bilić, B., Bajić, D., *Projektiranje proizvodnih sustava*, (e-udžbenik, recenzent prof. dr. sc. Roko Cebalo), Split, 2001.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Banduka, N., Veža, I., Bilić, B., *An integrated lean approach to Process Failure Mode and Effect Analysis (PFMEA): A case study from automotive industry*, Advances in Production Engineering & Management, (ISSN 1854-6250), 11 (4), 2016., str. 355-365 2. Gjeldum, N., Bilić, B., Kujundžić, F., *Application of modified value stream mapping tool for restructuring of make-to-order production system*, Proceedings of the 14th International Scientific Conference on Production Engineering - CIM'2013: Computer Integrated Manufacturing and High Speed Machining, (ISBN 978-953-7689-02-5), str. 113-118, Biograd, 2013. 3. Grubić, T., Veža, I., Bilić, B., *Integrating process and ontology to support supply chain modeling*, International Journal of Computer Integrated Manufacturing, (ISSN 0951-192X), 24 (9), 2011., str. 847-863 4. Gjeldum, N., Veža, I., Bilić, B., *Simulation of Production Process Reorganized with Value Stream Mapping*, Tehnički vjesnik – Technical Gazette, (ISSN 1330-3651), 18 (3), 2011., str. 341-347 5. Bilić, B., Radojičić, M., Veža, I., Nešić, Z., *Some considerations on the development of the information subsystem for production planning*, Proceedings of the 1st International Symposium "Engineering Management and Competitiveness" (EMC2011), (ISBN 978-86-7672-135-1), str. 131-136, Zrenjanin, 2011.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Innovative smart enterprise (INSENT), HRZZ, 2014.-2018. 2. Network of Innovative Learning Factories NIL, "System - Learning Factory", FESB, Split, University of Reutlingen, 2014.-2016. 3. LEONARDO DA VINCI Project "LOPEC - Logistics personnel excellence by continuous self-assessment", FESB Split, University of Reutlingen, 2013.-2014. 4. Project TEMPUS-2008-IT-JPCR 144 959, Master Study Program in Product Lifecycle Management with Sustainable Production, 2008.-2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of	Training for teachers and administrative staff in the EU project ME4CataLOgue Croatian Catalogue of knowledge, skills and competences for mechanical engineering studies (Bachelor, Master and Doctoral study programmes) based on learning outcomes, Split, 2014

competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	1. Croatian Association of Production Engineering – gold medal, Zagreb, 2005. 2. Innovation Fair INOVA'95 - Gold medal and a plaque for innovation "Production system planning and optimization by using simulation", Zagreb, 1995.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4.4

UBACITI - BUGARIN CV

First and last name and title of teacher	**Mojmil Cecić, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Robotics
GENERAL INFORMATION ON COURSE TEACHER	
Address	Slavonska 6, Split
Telephone number	091 4 305 828
E-mail address	mcecic@fesb.hr
Personal web page	-
Year of birth	1960.
Scientist ID	122922
Research or art rank, and date of last rank appointment	Scientific Adviser, 20th November, 2007.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor; 20th March, 2014.
Area and field of election into research or art rank	Technical Science, Electrotehnics
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	15th January, 1985.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Control Systems, Robotics
Function	Head of the Department of Electronics and Computer Science
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD.
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	25th June, 1999.
INFORMATION ON ADDITIONAL TRAINING	
Year	1988.
Place	Budapest, Hungary
Institution	Budepest University of Technology and Economics
Field of training	Industrial robotics
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	1. Automatics I (Vocational Study Programme) 2. Automatics II (Vocational Study Programme) 3. Control Systems I (Undergraduate Study Programme) 4. Control Systems II (Undergraduate Study Programme) 5. System Theory (Undergraduate Study Programme) 6. Nonlinear Control Systems (Graduate Study Programme)
Authorship of university/faculty textbooks in the field of the course	1. V. Zanchi, M. Bonković, M. Cecić, Programska podrška linearnoj teoriji automatskog upravljanja, FESB, Split.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Stančić, Ivo; Cecić, Mojmil; Ljubičić, Ante; Identification of UAV Engine Parameters. // WSEAS TRANSACTIONS ON SYSTEMS AND CONTROL. 10 (2015) ; 179-185 (članak, znanstveni).

	2. Musić, Josip; Bonković, Mirjana; Cecić, Mojmil; Comparison of uncalibrated model-free visual servoing methods for small amplitude movement: a simulation study. // International journal of advanced robotic systems. 11 (2014) , 108; 1-16 (članak, znanstveni) 3. Cecić, Mojmil; Papić, Vladan; Bonković, Mirjana; Grujić, Tamara; Musić, Josip; Kuzmanić Skelin, Ana; Stančić, Ivo; Marasović, Tea; Čić, Maja; Pleština, Vladimir; Science and Technology in Biomedical Engineering: LaBACS Case Example. // Physical Medicine and Rehabilitation - International. 1 (2014) , 2; 1-11 (članak, znanstveni). 4. Stančić, Ivo; Musić, Josip; Cecić, Mojmil; A Novel Low-Cost Adaptive Scanner Concept for Mobile Robots. // Ingeniería e Investigación. 34 (2014) , 3; 37-43 (članak, znanstveni). 5. Cecić, Mojmil; Krajči, Vesna; Bonković, Mirjana; Optimization of Model-Reference Variable-Structure Controller Parameters for Direct-Current Motor. // Journal of Computations and Modelling. 2 (2012.) , 3; 67-88 (članak, znanstveni).
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	1. Stančić, Ivo; Cecić, Mojmil; Ljubičić, Ante; Identification of UAV Engine Parameters. // WSEAS TRANSACTIONS ON SYSTEMS AND CONT ROL. 10 (2015) ; 179-185 (članak, znanstveni). 2. Musić, Josip; Bonković, Mirjana; Cecić, Mojmil; Comparison of uncalibrated model-free visual servoing methods for small amplitude movement: a simulation study. // International journal of advanced robotic systems. 11 (2014) , 108; 1-16 (članak, znanstveni) 3. Cecić, Mojmil; Papić, Vladan; Bonković, Mirjana; Grujić, Tamara; Musić, Josip; Kuzmanić Skelin, Ana; Stančić, Ivo; Marasović, Tea; Čić, Maja; Pleština, Vladimir; Science and Technology in Biomedical Engineering: LaBACS Case Example. // Physical Medicine and Rehabilitation - International. 1 (2014) , 2; 1-11 (članak, znanstveni). 4. Stančić, Ivo; Musić, Josip; Cecić, Mojmil; A Novel Low-Cost Adaptive Scanner Concept for Mobile Robots. // Ingeniería e Investigación. 34 (2014) , 3; 37-43 (članak, znanstveni). 5. Cecić, Mojmil; Krajči, Vesna; Bonković, Mirjana; Optimization of Model-Reference Variable-Structure Controller Parameters for Direct-Current Motor. // Journal of Computations and Modelling. 2 (2012.) , 3; 67-88 (članak, znanstveni).
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Projekt 0023022: Biomechanics of Human Walking, Control and Rehabilitation, MZT RH, 2008.-2013. 2. Computer Intelligence in Recognition and Support of Human Activities (RIPrePAkt), project FESB.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average	

grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Vedrana Cvitanić, Ph. D., Associate Professor**
The course he/she teaches in the proposed study programme	Theory of Plasticity and Viscoelasticity
GENERAL INFORMATION ON COURSE TEACHER	
Address	Lovretska 19, 21000 Split, Hrvatska
Telephone number	021-305-970
E-mail address	vcvit@fesb.hr
Personal web page	
Year of birth	1970.
Scientist ID	233760
Research or art rank, and date of last rank appointment	Scientific Adviser, 11/5/2011
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associated Professor, 19/7/2012
Area and field of election into research or art rank	Technical Sciences, Field Basic Technical Sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	22/09/1995
Name of position (professor, researcher, associate teacher, etc.)	Associated Professor
Field of research	Theory of plasticity, Continuum mechanics
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	19/05/2006
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme	Mechanics 1 - Mechanical Engineering, Naval Architecture, Undergraduate study programme, FESB

where it is/was offered, and level of study programme)	Mechanics 1 - Industrial Engineering, Undergraduate study programme, FESB Technical Mechanics 1 - Mechanical Engineering, Naval Architecture, Professional study programme, FESB Mechanics of materials - Mechanical Engineering, Naval Architecture, Professional study programme, FESB
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Cvitanić, V., Kovačić, M., Vladislavić, A., Numerical analysis of accuracy for evolutionary anisotropic plasticity models, *Engineering review* 36 (3), 255-267, 2016. 2. Cvitanić, V., Kovačić, M., Algorithmic formulation for evolutionary anisotropic plasticity model for sheet metals, Proceedings of the 8th International Congress of Croatian Society of Mechanics, CD-ROM, Opatija, Croatia, 2015. 3. Cvitanić, V., Ivandić, D., Lela, B., Comparison of orthotropic constitutive models in predicting square cup deep drawing process of AA2090-T3 sheet, Conference Proceedings of 4th International conference "Mechanical Technologies and Structural Materials", str. 61-70, Split, Croatia, 2014. 4. Cvitanić, V., Ivandić, D., Krstulović-Opara, L., Influence of constitutive and process parameters on the cylindrical cup deep drawing predictions for Al2090-T3 sheet. Conference Proceedings of 3rd International conference "Mechanical Technologies and Structural Materials", str. 117-126, Split, Croatia, 2013. 5. Cvitanić, V., Salečić, M., Vukasović, M., Numerical simulations of S-rail forming for Al 6111-T4 sheet based on Hill stress function, Proceedings of 7th International Congress of Croatian Society of Mechanics, CD-ROM, Zadar, Croatia, 2012.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. FESB - reseach project, Linear and nonlinear analysis of thin-walled structures, 2013.- 2. Croatian Ministry of Science, Education and Sport - science project number 023-0231744-1747, Inverse procedures and advanced algorithms in dynamics of structures and machines, 2006.-2013. 3. Croatian Ministry of Science, Education and Sport - science project number 023-0231744-3113, Intelligent and evolutionary algorithms in the optimization of materials and structures, 2006.-2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences	ME4CataLOgue (Mechanical Engineering for Catalogue) Hrvatski katalog znanja, vještina i kompetencija za studije strojarstva temeljen na ishodima učenja. (participation at workshop „Training for teachers“, April 2014.)
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and	

scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Mechanics 1 - Undergraduate study programme, Mechanical Engineering, Naval Architecture - 4,2/5 Mechanics 1 - Undergraduate study programme, Industrial Engineering - 4,3/5 Mechanics of Materials – Professional study programme, Mechanical Engineering, Naval Architecture – 4,3/5

First and last name and title of teacher	**Marin Despalatović, Ph. D., Asociate Professor**
The course he/she teaches in the proposed study programme	Electrical Drives
GENERAL INFORMATION ON COURSE TEACHER	
Address	R. Boškovića 32, HR-21000 Split
Telephone number	+385 (0)21 305 813
E-mail address	marin.despalatovic@fesb.hr
Personal web page	
Year of birth	1976.
Scientist ID	248733
Research or art rank, and date of last rank appointment	Senior scientific associate, November 22nd, 2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, September 20th, 2016.
Area and field of election into research or art rank	Technical Sciences – Field Electrical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	May 10th, 2001.
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Research and teaching in electrical machines and drives
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD (in Electrical Engineering)
Institution	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	April 24th, 2009.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	Electrical Machines – 113 – Undergraduate Study: Electrical Engineering and Information Technology Modeling of Electromechanical Systems – 231 – Graduate Study: Electrical Engineering

study programme)	Transients in Electrical Machines – 231, 232 – Graduate Study: Electrical Engineering Electrical Drives – 511 – Vocational Study: Electrical Engineering Design of Low Voltage Facilities – 511 – Vocational Study: Electrical Engineering
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Majić, G.; Despalatović, M.; Terzić, B.; Slutej, A.: Influence of Dead-time on Design of LCL-filter for Three-phase Voltage Source Converter, EDPE Conference Proceedings, 2013. 2. Despalatović, M.; Jadrić, M.; Terzić, B.: Modeling of Saturated Synchronous Generator Based on Steady-State Operating Data, IEEE Transactions on Industry Applications, 48(1), 2012. 3. Terzić, B.; Despalatović, M.; Slutej, A.: Magnetization Curve Identification of Vector-Controlled Induction Motor at Low-Load Conditions, Automatika, 53, 2012. 4. Jadrić, M.; Terzić, B.; Despalatović, M.; Majić, G.; Slutej, A.; Šimić, T.: Identification of Rotor Resistance and Transient Inductance of Induction Motors Using Frequency Selection Criterion, Proc. of the XXth International Conference on Electrical Machines, 2012. 5. Jadrić, M.; Despalatović, M.; Terzić, B.: Development of synchronous generator saturation model from steady-state operating data, Electric Power Systems Research, 80(11), 2010.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Smart Grid Metrology Infrastructure, HRZZ 2. A safer and more efficient cogeneration / trigeneration facilities, co-financing EU fund for science and innovation 3. Development of electrical drives for large industrial cranes working in heavy duty conditions, collaboration with ABB Crane Systems 4. On-line parameter identification of synchronous generator, MZOŠ 5. State and parameter estimation of electrical machines, MZT
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences.	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Evaluation organizer University of Split Scale from 2 (sufficient) to 5 (excellent) Course: Electrical Drives – 511, average grade 4.0 Electrical Machines – 113, average grade 4.2 Modeling of Electromechanical Systems – 231, average grade 4.5

First and last name and title of teacher	**Željko Domazet, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Fatigue strength
GENERAL INFORMATION ON COURSE TEACHER	
Address	R. Boškovića 32
Telephone number	+385/21/305777
E-mail address	Zeljko.domazet@fesb.hr
Personal web page	www.fesb.hr
Year of birth	1954
Scientist ID	95632
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor – permanent position 2005.
Area and field of election into research or art rank	Technical sciences, mechanical engineering, general mechanical engineering (structures)
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split Faculty of Electr. Eng., Mech. Eng. and Naval Arch.
Date of employment	1980.
Name of position (professor, researcher, associate teacher, etc.)	Full professor - permanent position
Field of research	metal structures, fatigue
Function	head of Department of Mechanical Eng. And Naval Arch.
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Dr.sc.
Institution	FSB-Zagreb
Place	Zagreb
Date	1993.
INFORMATION ON ADDITIONAL TRAINING	
Year	1988., 1990.
Place	Darmstadt, Germany
Institution	Fraunhofer Institut fuer Betriebsfestigkeit
Field of training	Fatigue
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	

Authorship of university/faculty textbooks in the field of the course	L. Krstulović-O., Ž. Domazet: Dizajn industrijskih proizvoda V.Grubišić, Ž. Domazet: Pogonska čvrstoća-interna skripta Ž. Domazet, L. Krstulović-O., Osnove mehaničkih konstrukcija
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Domazet, Željko; Lukša, Francisko; Stanivuk, Tatjana. **An optimal design approach for calibrated rolls with respect to fatigue life**. // *International journal of fatigue*. **59** (2014) ; 50-63 2. Krstulović-Opara, Lovre; Domazet, Željko; Garafulić, Endri. **Detection of osmotic damages in GRP boat hulls**. // *Infrared physics & technology*. **60** (2013.) ; 359-364 3. Domazet, Željko; Lukša, Francisko; Bugarin, Miro. **Fatigue Strength of the Rolls with Grooves**. // *Applied Mechanics and Materials*. **459** (2014) ; 330-334 4. Domazet, Željko; Lukša, Francisko; Stanivuk, Tatjana. **The influence of rolling speed on the fatigue life of rolls with grooves**. // *International journal of damage mechanics*. (2014) 5. Krstulović-Opara, Lovre; Garafulić, Endri; Klarin, Branko; Domazet, Željko. **Application of gradient based IR thermography to the GRP structures inspection**. // *Key Engineering Materials*. **488-489** (2012) ; 682-685
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Domazet, Željko; Lukša, Francisko. **Influence of Rolling Temperature on Fatigue Life of Calibrated Rolls**. // *Advanced materials research*. **742** (2013) ; 482-487 2. Domazet, Željko; Lukša, Francisko; Šušnjar, Marko; Korun Curić, Kristina. **Stress-time History of Rolls with Grooves**. // *Transactions of FAMENA*. **35** (2011) , 3; 67-74 3. Krstulović-Opara, Lovre; Domazet, Željko; Klarin, Branko; Garafulić, Endri. **The Application of IR Thermography to the NDT and Thermal Stress Analysis**. // *HDKBR info*. **1** (2012.) , 6/7; 17-22 4. Krstulović-Opara, Lovre; Klarin, Branko; Neves, Pedro; Domazet, Željko. **Thermal imaging and Thermal Stress Analysis of the impact damage of composite materials**. // *Engineering failure analysis*. **18** (2011) ; 713-719 Vesenjak, Matej; Krstulović-Opara, Lovre; Ren, Zoran; Domazet, Željko. **Cell shape effect evaluation of polyamide cellular structures**. // *Polymer testing*. **29** (2010) , 8; 991-994
The name of the programme and the volume in which the main	„Training for administrative and educational personnel" part of the EU project ME4CataLOgue (Mechanical Engineering for

teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Catalogue)
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	University of Split, Rector price, 2015.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Results are confidential matter and kept by employer (University of Split, FESB)

First and last name and title of teacher	**Nikola Gjeldum, Ph. D., Assistant Professor**
The course he/she teaches in the proposed study programme	Manufacturing Process Planning
GENERAL INFORMATION ON COURSE TEACHER	
Address	Mosećka 6, Split, Hrvatska
Telephone number	+385914305934
E-mail address	nikola.gjeldum@fesb.hr
Personal web page	http://marjan.fesb.hr/~ngjeldum/
Year of birth	1979
Scientist ID	287306
Research or art rank, and date of last rank appointment	Senior Research Associate, 20/3/2011
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant Professor, 15/6/2016
Area and field of election into research or art rank	Technical Sciences, Field Mechanical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	14/5/2006
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Manufacturing technology, production organization, plant layout, design for manufacturing and assembly
Function	Assistant professor
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	25/02/2011
INFORMATION ON ADDITIONAL TRAINING	
Year	2009
Place	Aachen, Germany
Institution	RWTH WZL Aachen
Field of training	Optimization of manufacturing processes and product design for manufacturability
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4) (very good)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course	Manufacturing process planning

teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Mechanical engineering 1. year of graduate study
Authorship of university/faculty textbooks in the field of the course	-
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Gjeldum, Nikola; Bilić, Boženko; Veža, Ivica. Investigation and modelling of process parameters and workpiece dimensions influence on material removal rate in CWEDT process. // International journal of computer integrated manufacturing. 28 (2015) , 7; 715-728. 2. Gjeldum, Nikola; Bilić, Boženko; Kujundžić, Fabris. Application of modified value stream mapping tool for restructuring of make-to-order production system // CIM 2013 : Computer Integrated Manufacturing and High Speed Machining / Abele, Eberhard ; Udiljak, Toma ; Ciglar, Damir (ur.). Zagreb : Croatian Association of Production Engineering, 2013. 113-118. 3. Gjeldum, Nikola; Veža, Ivica; Bilić, Boženko. Prediction of Material Removal Rates of Cylindrical Wire Electrical Discharge Turning Processes. // Transactions of FAMENA. 35 (2011) , 1; 27-38. 4. Gjeldum, Nikola; Veža, Ivica; Bilić, Boženko. Simulation of production process reorganized with value stream mapping. // Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 18 (2011) , 3; 341-347. 5. Veža, Ivica; Gjeldum, Nikola; Celent, Luka. Lean Manufacturing Implementation Problems in Beverage Production Systems. // International Journal of Industrial Engineering and Management (IJIEM). 2 (2011) , 1; 21-26.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Collaboration with industry – implementation of production reorganizationimplementacija, improvement of production and assembly processes and products: FEAL d.o.o. Široki Brijeg, Bosnia and Herzegovina, - production and assebbly of alluminium parts DALSTROJ d.d. production and assembly of winches BRODOTROGIR d.d. shipyard KONČAR – production and assembly of power transformers
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Scientific award Festo: Young researcher and scientist support scolarship, kao autoru nagrađenog rada, dodijeljena na 19. DAAAM International Symposium on Intelligent

	Manufacturing & Automation, Trnavi, Slovakia, 22-25.10.2008.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,54 University of Split, Department for quality assurance, Manufacturing Process Planning, Principles of Manufacturing Process Design

First and last name and title of teacher	**Sonja Jozić, Ph. D., Assistant Professor**
The course he/she teaches in the proposed study programme	Nonconventional machining processes Computer aided manufacturing Machine tools
GENERAL INFORMATION ON COURSE TEACHER	
Address	Sibovica 10, Kaštel Lukšić
Telephone number	091 4305 914
E-mail address	sjozic@fesb.hr
Personal web page	
Year of birth	1967.
Scientist ID	297785
Research or art rank, and date of last rank appointment	Research Associate, 04.07.2012.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant Professor, 19.12.2012.
Area and field of election into research or art rank	Technical Science, Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	01.10.2007.
Name of position (professor, researcher, associate teacher, etc.)	Assistant Professor
Field of research	Manufacturing Engineering, Metal Cutting Processes, Computer Aided Manufacturing
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	15.02.2012.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English language (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German language (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name	**Undergraduate studies:** 3. Tehnology 1 (130)

title of course, study programme where it is/was offered, and level of study programme)	**Professional undergraduate studies:** 1. Computer Aided Manufacturing (530) **Graduate studies:** 1. Machine tools and systems (270) **Postraduate doctoral studies:** 1. Optimization of machining processes (330)
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Jozić, Sonja; Bajić, Dražen; Celent, Luka. **Application of compressed cold air cooling: achieving multiple performance characteristics in end milling process**. // Journal of cleaner production. 100 (2015) , /; 325-332 (paper, scientific). 2. Jozić, Sonja; Lela, Branimir; Bajić, Dražen. A New **Mathematical Model for Flank Wear Prediction Using Functional Data Analysis Methodology**. // Advances in Materials Science and Engineering. 2014 (2014) ; 1-8 (paper, scientific). 3. Jozić, Sonja; Bajić, Dražen; Stoić, Antun. **Flank wear and surface roughness in end milling of hardened steel**. // Metalurgija. 54 (2015) , 2; 343-346 (paper, scientific). 4. Celent, Luka; Bajić, Dražen; Jozić, Sonja. **Application of reverse engineering process in mould manufacturing industry** // Mechanical technologies and structural materials, 2011, Split, Croatia, pp. 29-32. (lecture, international review, published work, scientific)
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Bajić, D., Celent, L., Jozić, S., Projektiranje tehnologije i izrada kalupa za proizvodnju medicinske obuće, (Naručitelj; Dr. Luigi d.o.o., Šestanovac), Split 2015. 2. Bajić, D., Celent, L., Jozić, S., Konstrukcija i izrada modela za proizvodnju ribarskog pribora, (Naručitelj; DTD d.o.o., Dugi rat) Split, 2014. 3. Bajić, D., Celent, L., Jozić, S., Konstruiranje i 3D tiskanje modela boca za projektiranje punionice, (Naručitelj: Logistika Violeta d.o.o. Sveti Ivan Zelina), Split, 2013. 4. Bajić, D., Celent, L., Jozić, S., Konstrukcija i izrada kalupa za upravljač studentske formule, (Naručitelj: UPS, Split), Split, 2012. Bajić, D., Celent, L., Jozić, S., Izrada kočionog sustava student formule primjenom 3D tiska, (Naručitelj: UPS, Split), Split, 2012.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Training for teachers and administrative staff within the EU Project ME4CataLOgue, Split, 2014. The program of additional pedagogical psychological education, University of Split, Faculty of Science, 1999.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course	

described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Branko Klarin, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	1. Aerotechnics and wind turbines 2. Hybrid energy systems 3. Technical innovations
GENERAL INFORMATION ON COURSE TEACHER	
Address	A. Hebranga 7, 23000 Zadar
Telephone number	091-6305950
E-mail address	Branko.Klarin@fesb.hr
Personal web page	www.fesb.hr/~bklarin
Year of birth	1962.
Scientist ID	3118339
Research or art rank, and date of last rank appointment	Scientific advisor, 11.05.2011.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Professor, 17.02.2016.
Area and field of election into research or art rank	Technical sciences, machine engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Fakultet elektrotehnike, strojarstva i brodogradnje - Split
Date of employment	01.06.1991.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Renewable energy systems, Aerotechnics,
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	D.sc.
Institution	Fakultet elektrotehnike, strojarstva i brodogradnje - Split
Place	Split
Date	03.12.2004.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German, 2
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	

Authorship of university/faculty textbooks in the field of the course	Aerotechnics and wind turbines, on-line course (on Croatian) Hybrid energy systems, on-line course (on Croatian) Technical innovations, on-line course (on Croatian)
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Ninić, Neven; Klarin, Branko; Tolj, Ivan. *Hybrid wind-power-distillation plant*. // Thermal Science. 16 (2012) , 1; 249-259 2. Klarin, Branko; Dalia Milić Kralj, *Wing sails for hybrid propulsion of the ships* // International Congress Energy and the Environment Opatija 2014, Rijeka, 2014. 339-350 3. Garafulić, E.; Klarin, B.: *Prihvatljivi način pohrane ugljikovog dioksida U Republici Hrvatskoj*, Tehnički vjesnik, 2013.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	ME4CataLOgue – Croatian catalogue of knowledge, skills and competences for mechine engineering studies based on learning outcomes – Training for teachers and administrative personel
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4.8/5 Dean's acknowledgement for best ranked 10% teachers in institution

First and last name and title of teacher	**Nikša Krnić, Associate Professor, Ph. D.**
The course he/she teaches in the proposed study programme	Materials 3
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 32
Telephone number	+38521305912
E-mail address	nkrnic@fesb.hr
Personal web page	-
Year of birth	1956.
Scientist ID	122696
Research or art rank, and date of last rank appointment	Research scientist, 2011.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate Professor, 2011., in re-election process
Area and field of election into research or art rank	Technical sciences, Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, FESB
Date of employment	1984.
Name of position (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	Production technologies
Function	-
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph. D.
Institution	FSB, Zagreb
Place	Zagreb
Date	1999.
INFORMATION ON ADDITIONAL TRAINING	
Year	1988. – 1989.; 1992.
Place	Berlin, Njemačka
Institution	Technische Universitat Berlin, Fuege- und Schweisstechnik
Field of training	Underwater Welding; Welding
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German, 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 2
COMPETENCES FOR THE COURSE	
Earlier experience as course	Performed, proposed and upgraded more similar or new

teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	courses on Undergraduate, Bachelor and Graduate studies on FESB, Faculty of Maritime Studies in Split, University Dept. of professional Studies in Splitu, University of Applied Sciences in Velika Gorica, Study of Underwater Science and Technology on the University of Zadar
Authorship of university/faculty textbooks in the field of the course	1. Duplančić, I.; Krnić, N.: "Materijali 3", Split, 2011., electronic book, FESB, e – learning portal, 2. Duplančić, I.; Krnić, N.; Bajić, D.: Osnove tehnologijâ, Split, 2008., electronic book, FESB, e – learning portal 1. Krnić, N.: Additive Layer Manufacturing Based on Robotic Electric-Arc Welding and Wire Feedstock, 41st Int. Conf. on Welding – Modern Joining Processes, Development of Filler Materials and Simulations, Opatija, June 2016. 2. Krnić, N.: Suvremene laserske tehnologije obrade materijala, Društvo inženjera strojarstva Split, DISS, Split, 2012., invited lecture 3. Kordić, Z.; Krnić, N.: Trends in Application of Composite Materials for Helicopter Rotor Blades, Proceedings of 2nd Conf. on Business Systems Management – UPS 2001, DAAAM, Mostar, 2001. 4. Krnić, N.; Dorn, L.; Kralj, S.: Welding Processes in Modern Shipbuilding Industry, Proc. of the 3rd International Conf. Welding in Maritime Engineering, Hvar, Croatia, 2004, HDTZ, CWS, pp. 523 - 532, ISBN 953-96454-6-8. 5. N. Krnić, N.; Bekavac, T.: Robotic Gas Metal Arc Welding and Off-line Programming for Metal Additive Layer Manufacturing, 41st Int. Conf. on Welding – Modern Joining Processes, Development of Filler Materials and Simulations, Opatija, June 2016.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?	ME4CataLOgoue (Mechanical Engineering for Catalogue)
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Award of the Croatian Welding Society Specialisation on Technical University of Berlin and fellowship of the German Academic Exchange Office (DAAD)

Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Lovre Krstulović-Opara, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Fatique strength of materials
GENERAL INFORMATION ON COURSE TEACHER	
Address	R. Boškovića 32
Telephone number	+385/21/305777
E-mail address	Lovre.Krstulovic-Opara@fesb.hr
Personal web page	http://marjan.fesb.hr/~opara/index.html
Year of birth	1967
Scientist ID	203806
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full professor – permanent position 9.12.2015.
Area and field of election into research or art rank	Technical sciences, mechanical engineering, general mechanical engineering (structures)
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split Faculty of Electr. Eng., Mech. Eng. and Naval Arch.
Date of employment	IX.2001.
Name of position (professor, researcher, associate teacher, etc.)	Full professor - permanent position
Field of research	metal structures, non-destructive testing
Function	head of Chair for structural mechanics and design
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Dr.-Ing.
Institution	Leibniz Universitaet Hannover
Place	Hannover
Date	13.12.2000.
INFORMATION ON ADDITIONAL TRAINING	
Year	2015 (MT), 2014 (VT), 2013 (PT), 2012 (UT)
Place	Zagreb
Institution	Croatian society of non-destructive testing
Field of training	NDT methods: UT2, MT2, VT2, PT1
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian 4
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	

Authorship of university/faculty textbooks in the field of the course	L. Krstulović-O., Ž. Domazet: Dizajn industrijskih proizvoda (skripta FESB) Ž. Domazet, L. Krstulović-O., Skripta iz osnova strojarstva (KTF)
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	I. Duarte, M. Vesenjak, L. Krstulovic-Opara:"Compressive behaviour of unconstrained and constrained integral-skin closed-cell aluminium foam", Composite structures, **154**, 231–238, 2016. L. Krstulović-Opara, M. Vesenjak, I. Duarte, Z. Ren, Ž. Domazet: "Infrared thermography as a method for energy absorption evaluation of metal foams", Materials Today: Proceedings, 3, 1025-1030, 2016. L. Krstulovic-Opara, M. Surjak, M. Vesenjak, Z. Tonković, J. Kodvanj, Ž. Domazet: "Comparison of infrared and 3D digital image correlation techniques applied for mechanical testing of materials", Infrared Physics & Technology, 73, 166-174, 2015. L. Krstulovic-Opara: "Application of thermography in analysis of fatigue strength of materials and structures", HDKBR info, 10, 3-11, 2013. L. Krstulovic-Opara, Ž. Domazet, E. Garafulic: "Detection of osmotic damages in GRP boat hulls", Infrared Physics & Technology, 60, 359-364, 2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	„Training for administrative and educational personnel“ part of the EU project ME4CataLOgue (Mechanical Engineering for Catalogue)
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Results are confidential matter and kept by employer (University of Split, FESB)

First and last name and title of teacher	**Branimir Lela, Ph. D., Assistant Professor**
The course he/she teaches in the proposed study programme	Tools and fixtures Modeling and optimization of technological processes
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 32, Split
Telephone number	021/305909
E-mail address	blela@fesb.hr
Personal web page	
Year of birth	1976
Scientist ID	250123
Research or art rank, and date of last rank appointment	Scientific associate, 10/12/2010
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	assistant professor, 18/04/2012
Area and field of election into research or art rank	Technical Sciences, Field Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	01/10/2001
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Engineering materials; Metal heat treatment; Forming by deformation; Numerical modelling of production processes; Tools and fixtures
Function	Vice Dean for Education
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	16/07/2010
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name	**Undergraduate study:** 1. Technology 2 (130)

title of course, study programme where it is/was offered, and level of study programme)	2. Technology 2 (150) 3. Fundamentals of technologies (140) **Professional study:** 1. Metal forming by deformation (530) 2. Technology of metal processing (540) **Graduate study:** 1. Tools and fixtures (263,261,271,272) **Postgraduate study**: 1. Processing by deformation (330)
Authorship of university/faculty textbooks in the field of the course	- Manual for laboratory exercise in processing by deformation - Manual for laboratory exercise in heat treatment
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Jozić, Sonja; Lela, Branimir; Bajić, Dražen. **A New Mathematical Model for Flank Wear Prediction Using Functional Data Analysis Methodology**. *Advances in Materials Science and Engineering*. **2014** (2014) ; 1-8 2. Lela, Branimir; Musa, Ante; Zovko, Oliver. **Model-based controlling of extrusion process**. *International journal of advanced manufacturing technology*. **74** (2014) , 9-12; 1267-1273 3. Krstić Vukelja, Elizabeta; Duplančić, Igor; Lela, Branimir. **Continuous roll casting of aluminium alloys– casting parameters analysis**. *Metalurgija*. **49** (2010) , 2; 115-118 4. Cvitanić, Vedrana; Ivandić, Daniel; Lela, Branimir. **Comparison of orthotropic constitutive models in predicting square cup deep drawing process of AA2090-T3 sheet** . *Proceedings of 4th International Conference Mechanical Technologies and Structural Materials 2014* / Živković, Dražen (ur.). Split : Croatian society for mechanical technologies, 2014. 61-70 5. Lela, Branimir; Živković, Dražen; Šapina, Ivona. **ANNEALING INFLUENCE ON GRAIN SIZE AND MECHANICAL PROPERTIES IN LOW CARBON STEELS**. *Mechanical technologies and structural materials conference proceedings* / Živković, Dražen (ur.). Split : Croatian society for mechanical technologies, 2013. 127-132
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Improving the properties and methods of processing aluminium alloys Project manager: prof. dr. sc. Igor Duplančić, Time period: 2007.-2014. Financing: MZOŠ 2. Parameters optimization and prediction of results of metal heat treatment Project manager: prof. dr. sc. Božo Smoljan, Time period: 2014.- Financing: HRZZ
The name of the programme and the volume in which the main	Training for teachers and administrative staff within EU project ME4CataLOgue

teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4.5/5

First and last name and title of teacher	**Željan Lozina, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Finite element method, Vibration, Measuring and experimental analysis of Vibration
GENERAL INFORMATION ON COURSE TEACHER	
Address	Rendićeva 18
Telephone number	021-305-968
E-mail address	zeljan.lozina@fesb.hr
Personal web page	http://marjan.fesb.hr/~lozina/
Year of birth	1956.
Scientist ID	96925
Research or art rank, and date of last rank appointment	Scientific Adviser, 21.06.2000.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 09.03.2005.
Area and field of election into research or art rank	Engineering Sciences, Field Engineering mechanics
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	22.10.1982
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Dynamics/Vibration, Numerical methods, FEM
Function	Head of Chair of Dynamics and Vibration
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	FSB – Univerity of Zagreb
Place	Zagreb
Date	05.04.1989.
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	Udine, Italy
Institution	CISM
Field of training	Engineering Mechanics
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French (2)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	Mechanics of materials, Programming, Mechanisms, Vehicle (ship) systems,…

study programme)	
Authorship of university/faculty textbooks in the field of the course	Finte element method, Univerity of Split Kinematics, Univerity of Split Dynamics, Univerity of Split Programming, Univerity of Split
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. 1. Sedlar, Damir; Lozina, Željan; Vučina, Damir: An implementation of structural change detection procedure based on experimental and numerical model correlation. // Journal of sound and vibration. 331 (2012) , 13; 3068-3082 2. Vučina, Damir; Lozina, Željan; Pehnec, Igor.: Ad-Hoc Cluster and Workflow for Parallel Implementation of Initial-Stage Evolutionary Optimum Design. // Structural and multidisciplinary optimization. 45 (2012) , 2; 197-222 3. Vučina, Damir; Lozina, Željan; Pehnec, Igor.: Computational procedure for optimum shape design based on chained Bezier surfaces parameterization. // Engineering applications of artificial intelligence. 25 (2012) , 3; 648-667 4. Vučina, Damir; Lozina, Željan; Vlak, Frane.: NPV-based decision support in multi-objective design using evolutionary algorithms. // Engineering applications of artificial intelligence. 23 (2010) , 1; 48-60 5. Lozina, Željan; Sedlar, Damir; Vučina, Damir.: Model Update with Observer/Kalman Filter and Genetic Algorithm Approach. // Transactions of FAMENA. 36 (2012)
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	1. Cvitanić, Vedrana; Duplančić, Igor; Lozina, Željan; Ivandić, Daniel.:Earing predictions for Al2008-T4 sheet. // Aluminium and its alloys. 3 (2011) ; 73-77 2. Sedlar, Damir; Lozina, Željan; Vučina, Damir. 3. Comparison of Genetic and Bees Algorithm in the Finite Element Model Update. // Transactions of FAMENA. 35 (2011) , 1; 1-12
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. HRZZ Istraživački projekt: Mjeriteljska infrastruktura za pametne mreže, 2015. - 2018. 2. LLP - ERASMUS: Strategic Alignment of Electrical and Information Engineering in European Higher Education Institutions, 2012. -2014. 3. TEMPUS: Creation of the third cycle studies-doctoral studies in metrology Trajanje projekta: 2010. – 2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Me4
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,8/5

First and last name and title of teacher	**Gojko Magazinović, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Computer Aided Design 1, Computer Aided Design 2
GENERAL INFORMATION ON COURSE TEACHER	
Address	Trg Mihovila Pavlinovića 6, 21000 Split, HR
Telephone number	+385 21 305 966
E-mail address	gmag@fesb.hr
Personal web page	www.fesb.hr/~gmag
Year of birth	1956
Scientist ID	139574
Research or art rank, and date of last rank appointment	Scientific Adviser, 1/12/2010
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor, 27/9/2012
Area and field of election into research or art rank	Technical Sciences, Field Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	1/9/1994
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Engineering applications of computer
Function	Teacher
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	14/3/2002
INFORMATION ON ADDITIONAL TRAINING	
Year	2004, 2005
Place	Split
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Field of training	Computer aided design (Pro/Engineer, Catia, Unigraphics; three separate courses)
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme	Computer Aided Design, Undergraduate study programme

where it is/was offered, and level of study programme)	
Authorship of university/faculty textbooks in the field of the course	1. Magazinović, Gojko: Primjena elektroničkih računala – Podloge za laboratorijske vježbe - Programski jezik Fortran 90, Skripta, FESB Split, ISBN 953-6114-60-7, Split, 2003. 2. Magazinović, Gojko: Primjena elektroničkih računala – Podloge za laboratorijske vježbe - Programski jezik C, Skripta, FESB Split, ISBN 953-6114-59-3, Split, 2003.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Pivac, Ivan; Magazinović, Gojko. Numerical analysis of tank heating coil heat transfer process, in: Towards Green Marine Technology and Transport // Guedes Soares, Carlos; Dejhalla, Roko; Pavletić, Duško (Eds). London: Taylor & Francis Group, 2015. 603-608. 2. Bezmalinović, Dario; Magazinović, Gojko; Barbir, Frano. Analysis of Fuel Cell Stacks Degradation by Polarization Change Curves // Proceedings, 2014 IEEE Vehicle Power and Propulsion Conference VPPC2014 / Paulo J. G. Pereirinha (Ed.). IEEE, 2014. 139-141. 3. Magazinović, Gojko. Least Inertia Approach to Low-speed Marine Diesel Propulsion Shafting Optimum Design, Brodogradnja 65(2014)3, 75-87. 4. Magazinović, Gojko. Transient Torsional Vibration Analysis of Marine Propulsion Plants, // Proceedings, Sorta 2014 / Dejhalla, Roko (Ed.). Rijeka: Tehnički fakultet, Sveučilište u Rijeci, 2014. 505-512 5. Magazinović, Gojko. Castor - A Propulsion Shaftline Torsional Vibration Assessment Tool, Paper No. 76, // Proceedings Sorta 2012 / Žiha, Kalman, et al. (Eds.). Zagreb: Faculty of Mechanical Engineering and Naval Architecture, Zagreb, and Brodarski Institute, Zagreb, 2012.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. HRZZ Istraživački projekt: Upravljanje vodom i toplinom i trajnost membranskih gorivnih članaka, 2015-2018. 2. FP7 Istraživački projekt: SAPPHIRE, 2013-2016.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	IPA IV projekt "ME4CataLOgue - Hrvatski katalog znanja, vještina i kompetencija za studije strojarstva temeljen na ishodima učenja (za preddiplomski, diplomski i doktorski studij)", Trening implementacije ishoda učenja u razvoj studijskih programa i kurikuluma, Split, 2014.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Award for the significant results achieved in scientific research, FESB Split, 1982.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,0/5

First and last name and title of teacher	**Daniela Matić, Ph.D., Assistant Professor**
The course he/she teaches in the proposed study programme	English Language for Academic Purposes - Mechanical Engineering graduate studies; English Language for Academic Purposes – Automation and drives graduate studies.
GENERAL INFORMATION ON COURSE TEACHER	
Address	Matice hrvatske 23, 21000 Split
Telephone number	098/ 1766010
E-mail address	daniela.matic@fesb.hr
Personal web page	/
Year of birth	1967
Scientist ID	332846
Research or art rank, and date of last rank appointment	/
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor; January 23, 2013
Area and field of election into research or art rank	Humanities; philology
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	November 11, 2005
Name of position (professor, researcher, associate teacher, etc.)	English teacher
Field of research	ESP, pragmatics, discourse analysis, contact linguistcs
Function	/
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	Faculty of Humanities and Social Sciences, University of Zagreb
Place	Zagreb
Date	December 12, 2011
INFORMATION ON ADDITIONAL TRAINING	
Year	1998
Place	Barnstaple, Velika Britanija
Institution	Services for Open Learning, Barnstaple, Inservice Course in Teacher Training
Field of training	English language teaching methodology
Year	2002.
Place	Gyula, Hungary
Institution	A.S.Hornby International Trust, British Council, "Teaching English through Culture"
Field of training	English language teaching methodology
Year	2003
Place	Krakow, Poland
Institution	A.S.Hornby International Trust, British Council, "Intercultural Studies on the Web: Methodology and Materials"
Field of training	English language teaching methodology
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2	English; 5

(sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French; 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian; 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent	German; 2
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Course teacher of : - English Language 1, 2 and 3 courses at undergraduate studies of Computer Science, Electrical Engineering and IT and Naval Architecture; - English Language 1 and 2 courses at professional studies of Computer Science, Electrical Engineering and IT and Naval Architecture; - English Language for Academic purposes at graduate studies of Mechanical Engineering.
Authorship of university/faculty textbooks in the field of the course	/
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Matić, Daniela. (2012). Zamjenice u hrvatskim političkim govorima. *Filolog: časopis za jezik, književnost i kulturu*. V/2012, Univerzitet u Banjoj Luci, Filološki fakultet, ISSN 1986-5864. 2. Matić, Daniela. (2012). Jezične igre moći u drami Who's Afraid of Virginia Woolf? Edwarda Albeeja. *LINGUA MONTENEGRINA časopis za jezikoslovna, književna i kulturna pitanja,* god. V/2, br. 10. (2012). Podgorica: Institut za crnogorski jezik i književnost. ISSN 1800-7007. 3. Matić, Daniela. (2012). Ideological Discourse Structures in Political Speeches. *Komunikacija i kultura online. Elektronski časopis za jezik, komunikaciju i kulturu*. Godina III. Broj 3. http://www.komunikacijaikultura.org/KK3.html Beograd: FOKUS – Forum za interkulturnu komunikaciju. e-ISSN 2217-4257 (Online) UDC 8:008:316.7 4. Matić, Daniela. (2013). Pronouns in American Political Speeches. *LINGUA MONTENEGRINA časopis za jezikoslovna, književna i kulturna pitanja*, god. VI/1 br. 11. (2013). Podgorica: Institut za crnogorski jezik i književnost. ISSN 1800-7007. 5. Matić, Daniela, Nataša Stojan. (2013). Rodne oznake u oglasima za posao. Kroz jezike i kulture ; Across Languages and Cultures - *Zbornik radova sa Treće međunarodne konferencije Instituta za strane jezike (ICIFL3) i Treće međunarodne konferencije o interkulturnoj komunikaciji* / Lakić, Igor ; Kostić, Nataša (ur.). - Podgorica : Institut za strane jezike / Institute of Foreign Languages, 2013. 59-69 ISBN: 978-86-85263-10-1. 6. Matić, Daniela. (2014). Ideology Hidden in the Form of Croatian and American Political Speeches. *Teme. Časopis za društvene nauke.* Br.3 (2014). Niš: Univerzitet u Nišu. ISSN 0353-7919.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at	1. Matić, Daniela. (2014). Attitudes of computer science students to the English element in Croatian ICT magazines. *ESP Today. Journal of English for Specific Purposes at Tertiary Level*. Volume 2, Issue 2 (2014).

most)	http://www.esptodayjournal.org/index.html e-ISSN 2334-9050. 2. Matić, Daniela. (2015). Percepcija hrvatskih studenata računarstva o prihvatljivosti engleskoga elementa u glagolima, glagolskim imenicama i jukstaponiranim leksičkim segmentima u hrvatskim tekstovima iz područja računalnih i komunikacijskih tehnologija. *Od teorije do prakse u jeziku struke - Zbornik radova s 3. stručno-znanstvenog skupa Udruge nastavnika jezika struke na visokoškolskim ustanovama.*/ Cigan, Vesna; Omrčen, Darija (ur.) – Zagreb: Udruga nastavnika jezika struke na visokoškolskim ustanovama, 2015. 65-81.
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Students' attitudes toward the English element in ICT terminology
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Regular four-year studies of the English language and literature and the French language and literature at Zagreb University.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	/
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Positive

First and last name and title of teacher	Prof. dr. sc. Zoran Milas
The course he/she teaches in the proposed study programme	Fluid Flow
GENERAL INFORMATION ON COURSE TEACHER	
Address	Mažuranićevo šet.1, 21000, Split, HR
Telephone number	+385 21 305951
E-mail address	zmilas@fesb.hr
Personal web page	
Year of birth	1951.
Scientist ID	080670
Research or art rank, and date of last rank appointment	Scientific Adviser, 2016
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor, 2017
Area and field of election into research or art rank	Technical Sciences, Field of Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB)
Date of employment	1980
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Fluid Mechanics, Hydraulic Machines, Numerical Modelling
Function	Head of the Laboratory for Fluid Mechanics
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Mechanical Engineering and Naval Architecture
Place	Zagreb
Date	2001
INFORMATION ON ADDITIONAL TRAINING	
Year	1994
Place	Rhodes
Institution	UNEP, MAP
Field of training	Wind power engineering
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (-5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (-2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Fluid Mechanics, Undergraduate study programme, FESB Hydraulic Machines, Undergraduate study programme, FESB
Authorship of university/faculty	Zoran, Milas: Mehanika fluida, FESB Split, 2016

textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Milas, Zoran; Vučina, Damir; Ivo Marinić Kragić. "Multi-Regime Shape Optimization of Fan Vanes for Energy Conversion Efficiency Using CFD, 3D Optical Scanning and Parameterization", Engineering Application of Computational Fluid Mechanics, (1994-2060) , 8, (2014), 3,2014., 407-421 2. Vučina, Damir; Marinić-Kragić, Ivo; Milas, Zoran, "Numerical Models for Robust Shape Optimization of Wind Turbine Blades", Renewable Energy, (0960-1481) 87 (2016), 2, 2016, 849-862 3. Marinić-Kragić, Ivo; Vučina, Damir; Milas, Zoran, "3D Shape Optimization of Fan Vanes for Multiple Operating Regimes Subject to Efficiency and Noise Related Excellence Criteria and Constraints" Engineering Applications of Computational Fluid Mechanics (1994-2060) 10 (2016), 1, 2016, 210-228 4. Milas, Zoran; Penga, Željko, "Numerical Simulation of Fan Flow", Proceedings of the 8th ICCSM 2015, Opatija, ISBN 978-953-7539-21-4
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	-"Adaptive Parameterization of 3D Geometry for Shape Optimization and Meshless Numerical Modelling", nr. 6130. 2015-2018, Croatian Science Foundation -Optimizing shape (of turbomachines) using CFD (FESB Reasearch Group)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?	IPA IV project ME4Catalogue
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	University of Split, 4,5/5

First and last name and title of teacher	**Nedjeljko Mišina, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Economic Treatments of Materials
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 32, SPLIT
Telephone number	021/305911
E-mail address	nmisina@fesb.hr
Personal web page	----
Year of birth	1950.
Scientist ID	71172
Research or art rank, and date of last rank appointment	Scientific Adviser, 31/ 05/ 2006.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 25/1/2013.
Area and field of election into research or art rank	Technical Sciences, Field Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	1/10/1977
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Mechanical Engineering
Function	Head of Chair of Materials and Tribology
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Mechanical Engineering and Naval Architecture
Place	Zagreb
Date	24/6/1992.
INFORMATION ON ADDITIONAL TRAINING	
Year	-
Place	-
Institution	-
Field of training	-
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Germany (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Materials (530, 540), Materials 1 (150), Materials 2 (150, 130), Technology 1 (150), Welding and similar treatments (530, 540)
Authorship of university/faculty	

textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Ž. Bilić, N. Mišina, L. Kuščer, J. Diaci, I. Polajnar: ¨Influence of welding conditions on resistance flash welds¨, International Journal of Microstructure and Materials Properties, Vol. 8, No. 6, 2013., 425-435. 2. N. Mišina, I. Polajnar, Ž. Bilić: ¨Production and weldability of microalloyed steels¨, 6. International scientific-professional conference, Slavonski Brod, 2011., 15-26.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	1. I. Polajnar, N. Mišina: ¨Automation and/or robotization of welding processes¨, CIM 2011., Biograd, 195-202. 2. I. Polajnar, N. Mišina: ¨The latest achievement of personal protection for welders¨, 3. International Professional and Safety and Health, Zadar, 2010., 53-61
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Ž. Bilić, I. Samardžić, N. Mišina: ¨Opasnosti i mjere zaštite kod postupaka zavarivanja¨, Dan varilne tehnike, Novo Mesto, 2014., 185-189
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,3/6

First and last name and title of teacher	**Sandro Nižetić, Ph. D., Associate Professor**
The course he/she teaches in the proposed study programme	Heating and Air Conditioning, Energy Efficiency in Buildings.
GENERAL INFORMATION ON COURSE TEACHER	
Address	Slovenićeva 5, 21000, Split
Telephone number	+385914305954
E-mail address	snizetic@fesb.hr
Personal web page	
Year of birth	03.06.1980.
Scientist ID	272991
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	izv.prof., December 18, 2013.
Area and field of election into research or art rank	Technical sciences, Thermodynamics.
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	01/03/2003.
Name of position (professor, researcher, associate teacher, etc.)	Associate Professor
Field of research	Thermodynamics, Energy Efficiency, Energy Conversion, Renewable energy.
Function	Head of Laboratory for Thermodynamics and Energy Efficiency
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	12/02/2009
INFORMATION ON ADDITIONAL TRAINING	
Year	2016.
Place	USA
Institution	Florida solar energy research centre
Field of training	Renewable energy, energy efficiency in buildings.
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	Thermodynamics 1 and 2 (undergraduate study programme), Heat and mass transfer (graduate study programme), rational use of energy (graduate study programme).

study programme)	
Authorship of university/faculty textbooks in the field of the course	Heating and air Conditioning, online lectures (2010), FESB. Energy Efficiency in Buildings, online lectures (2011), FESB.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1) Nižetić, S.,Papadopulos, A.M.,Tina, G.M., Rosa-Clot, M. Hybrid energy scenarios for residential applications based on the heat pump split air-conditioning units for operation in the Mediterranean climate conditions, Energy and Buildings 140,110-120,(2017) 2) S. Nižetić, F. Grubišić- Čabo, I. Marinic-Kragić, A.M. Papadopoulos. Experimental and numerical investigation of a backside convective cooling mechanism on photovoltaic panels, Energy 111, 211-225, (2016). 3) Grubišić-Čabo, F., Nižetić, S., Tina, G.M. Photovoltaic panels: A review of the cooling techniques, Transactions of FAMENA, SI, 63-74, (2016). 4) Grigoropoulos, E., Anastaselos, D., Nižetić, S., Papadopoulos, A.M. Effective ventilation strategies for net zero-energy buildings in Mediterranean climates, International Journal of Ventilation, Pages 1-17, (under press, DOI: 10.1080/14733315.2016.1203607), (2016). 5) Nižetić, S., Čoko, D., Yadav, A., Grubišić-Čabo, F. Water spray cooling technique applied on a photovoltaic panel: The performance response, Energy Conversion and Management 108,287-296, (2016), 6) Lela, B., Barišić, M., Nižetić, S. Cardboard/sawdust briquettes as biomass fuel: Physical-Mechanical and thermal characteristics, Waste Management 47(B), 236-245, (2016), 7) Nižetić, S., Tolj, I., Papadopulos, A.M. Hybrid energy fuel cell based system for household applications in a Mediterranean climate, Energy Conversion and Management 105(15),1037-1045 (2015), 8) Nižetić, S., Duić, N., Papadopulos, A.M., Tina, G.M., Grubišić-Čabo, F. Energy efficiency evaluation of a hybrid energy system for building applications in a Mediterranean climate and its feasibility aspect, Energy 90, 1171-1179, (2015), 9) S. Nižetić, F. Grubišić-Čabo, M. Bugarin. Experimental setup for the analysis of vortices. Journal of Applied Fluid Mechanics 8(1),143-149, (2015) 10) S. Nižetić, R. Gizdic, A. Yadav, M. Bugarin. Integrated split heat pump system for building applications, Applied Mechanics and Materials 705, 263-267, (2015) 11) S. Nizetic, D. Coko, I. Marasovic, Experimental study on a hybrid energy system with small-and medium-scale applications for mild climates, Energy 75, 379-389, (2014) 12) S. Nizetic. Analytical approach for estimating the pressure drop potential in convective vortex heat engines. Transactions of the Canadian Society for Mechanical Engineering, 38(1), 81-91, (2014).
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	

Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	-2008. – 2013.- UNDP (United Nations Development Programme), "Removing Barriers to Energy Efficiency in Croatia", Project Coordinator for the Dalmatian region, -2007. – 2013.- Research project (023-0231751-3011), "New aspect of solar energy utilization in solar chimney power plants, Head of the scientific project, Ministry of Science, Education and Sports. -2003. - 2006., Research project (0023013), "Significant reduction of chimney height in solar chimney power plants", Researcher, Ministry of Science, Education and Sports. -2015.-to date-Research of the ice based floating structures, cooperation with DIV company.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,9/5.0

Ubaciti OŽEGOVIĆ CV EN

First and last name and title of teacher	**Vladan Papić, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Databases
GENERAL INFORMATION ON COURSE TEACHER	
Address	Makarska 2, 21000 Split
Telephone number	(021) 305649
E-mail address	vpapic@fesb.hr
Personal web page	www.fesb.hr/~vpapic
Year of birth	1968
Scientist ID	227412
Research or art rank, and date of last rank appointment	Scientific Adviser, 20/4/2010
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 17/12/2015
Area and field of election into research or art rank	Technical Sciences, Field Computer science
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	1/7/20097
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Computer Vision, Expert Systems
Function	Vice-dean for bussines
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	12/2/2002
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	Computers in technical systems (PMF, Informatika i tehnička kultura, Undergraduate study programme, 2002-2009.) Electronics (PMF, Informatika i tehnička kultura, Undergraduate study programme 2002 – 2009.)

study programme)	Systems theory (FESB, EIT, Undergraduate study programme, 2009-) Databases (FESB, Computing, Undergraduate study programme, 2009-)
Authorship of university/faculty textbooks in the field of the course	V.Papić, Lectures in electronics, University textbook, 2005. (in Croatian) V. Papić, Computer graphics, Faculty textbook, 2013. (in Croatian)
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. J. Musić, T. Marasović, V. Papić, I. Orović, S. Stanković, Performance of compressive sensing image reconstruction for search and rescue, IEEE Geoscience and Remote Sensing Letters, Volume 13, Issue 11, November 2016, Pages 1739-1743. 2. J. Musić, I. Orović, T. Marasović, V. Papić, S. Stanković, Gradient Compressive Sensing for Image Data Reduction in UAV Based Search and Rescue in the Wild, Mathematical Problems in Engineering, Volume 2016, 2016. 3. I. Orović, V. Papić, C. Ioana, X. Li, S. Stanković, Compressive Sensing in Signal Processing: Algorithms and Transform Domain Formulations, Mathematical Problems in Engineering, Volume 2016, 2016. 4. T. Marasović, V. Papić, V. Zanchi, LMNN metric learning and fuzzy nearest neighbour classifier for hand gesture recognition, Journal on Multimodal User Interfaces, Volume 9, Issue 3, 27 August 2015, Pages 211-221. 5. T. Marasović, V. Papić, J. Marasović, Motion-based gesture recognition algorithms for robot manipulation, International journal of advanced robotic systems. 12 (2015) , 51; 1-13.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	-
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. »Technology transfer infrastructure in the Croatian Adriatic region« - TTAdria (IPA IIIc), 2013-2015. 2. "Computer intelligence for recognition and support of human activities " (RIPrePAkt) (FESB), 2013-. (lead researcher). 3. „Search and rescue system prototype based on image processing " (FESB - Statim d.o.o.), 2014-. (lead researcher) 4. „Advanced methods of 3D virtualization – towards virtual turism and digitalization of cultural heritage“ (FESB – Neir d.o.o.), 2015-. (researcer). 5. International bilateral project Croatia- ”Compressive sensing and superresolution in surveillance systems based on optical sensors and UAVs ", Contract with MZOS RH and MZT Republike Crne Gore, 2015-2016. (researcher)
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Mentor of best student (Marko Trninić) in field of social and humanistic scienses (annual award HRZZ, 2010).
Results of student evaluation taken in the last five years for the course	3.9/5

that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	doc. dr. sc. Igor Pehnec
The course he/she teaches in the proposed study programme	Optimization methods
GENERAL INFORMATION ON COURSE TEACHER	
Address	FESB, R. Boškovića 32, 21000 Split
Telephone number	021 305 963
E-mail address	ipehnec@fesb.hr
Personal web page	
Year of birth	1981
Scientist ID	296703
Research or art rank, and date of last rank appointment	Research associate, 2013
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant Professor, 2017
Area and field of election into research or art rank	Technical Sciences, Fundamental Technical Sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	2007
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Numerical methods in engineering and optimization
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	2013
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	Several courses at CISM Italy
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Computer aided analysis Optimization methods Programming
Authorship of university/faculty	

textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	**p1.** Vučina, D.; Lozina, Ž.; Pehnec, I. Ad-Hoc Cluster and Workflow for Parallel Implementation of Initial-Stage Evolutionary Optimum Design. Structural and multidisciplinary optimization. 45 (2012) , 2; 197-222. IF 1.488. **p2.** Vučina, D.; Lozina, Ž.; Pehnec, I. Computational procedure for optimum shape design based on chained Bezier surfaces parameterization. Engineering applications of artificial intelligence. 25 (2012) , 3; 648-667. IF 1.665.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	s.a.
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	s.a..
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Continuously, lectures, conferences
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	excellent

First and last name and title of teacher	**Tonči Piršić, Ph. D., Associate Professor**
The course he/she teaches in the proposed study programme	Transport in industry
GENERAL INFORMATION ON COURSE TEACHER	
Address	Stepinčeva 2, 21000 Split
Telephone number	021/535517
E-mail address	tpirsic@fesb.hr
Personal web page	www.fesb.hr/kk
Year of birth	1959.
Scientist ID	134894
Research or art rank, and date of last rank appointment	Higher scientific colaborator 15. 06. 2016.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate proffesor 15. 06. 2016.
Area and field of election into research or art rank	Technical science, general mechanical engineering, construction
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	01. 10. 1987.
Name of position (professor, researcher, associate teacher, etc.)	Proffesor
Field of research	Machine elements, fatigue of materials, transport in industry
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Mechanical Engineering and Naval Architecture
Place	Zagreb
Date	15.06. 1999.
INFORMATION ON ADDITIONAL TRAINING	
Year	2001
Place	Bologna, Italy
Institution	University of Bologna
Field of training	Fatogu of materials
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Professor of Transport in industry Graduate study programme,
Authorship of university/faculty	T. Piršić: Tehničko crtanje, FESB Split, 2010.

textbooks in the field of the course	T. Piršić: AutoCAD u Strojarstvu, FESB Split, 2008. T. Piršić: Transport u industriji, FESB Split, 2005.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	T. Piršić: "Experimentally Based Method for Fatigue Life Prediction of Aluminium Welded Joints", Fatigue 99, Proceedings of the 7. International Fatigue Congress, Beijing, P.R. China, Editors X. R Wu and Z. G. Wang, pp. 1309 -1312, Volume 2/4, Higher Education Press, Beijing, P.R. China, Engineering Advisory Services Ltd, UK, 1999. ISBN 1901537080 (Rad objavljen u knjizi) Ž. Domazet, Ž. Lozina, T. Piršić: "Fatigue Damage and Repair of 250 kN Crane in Shipyard", Proceedings of the 10th International Conference on Fracture, Hawai, USA, 2001. Ž. Domazet, T. Piršić: "Fatigue Failures in industry – Case Studies", Proceedings of the 7th International Design Conference, Vol. 2., pp. 1153-1158, ISBN 953-6313-47-9, Dubrovnik, 2002. Ž. Domazet, T. Piršić, M. Stupalo: "Fatigue Damages and Repair of a Cement Mill Gear Wheel", Proceedings of 4th International Congress of Croatian Society of Mechanics, pp. 145-151, ISBN 953-96243-4-7, Bizovac, Croatia, 2003.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Srdjan Podrug, Ph.D., Associate Professor**
The course he/she teaches in the proposed study programme	Introduction to fracture mechanics (FESL18), Mechanical drives (FESL20)
GENERAL INFORMATION ON COURSE TEACHER	
Address	Kroz Smrdečac 13
Telephone number	+385-91-4305-992
E-mail address	spodrug@fesb.hr
Personal web page	www.fesb.hr/~spodrug
Year of birth	1971
Scientist ID	233771
Research or art rank, and date of last rank appointment	Senior scientific associate, 10/02/2010
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate professor, 17/02/2010
Area and field of election into research or art rank	Technical sciences, Mechanical Engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	5/02/1996
Name of position (professor, researcher, associate teacher, etc.)	Associate professor
Field of research	Machine Elements, Fatigue, Fracture Mechanics
Function	Chair of Machine Elements
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Ph.D.
Institution	University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	27/09/2004
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian 2
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Course teacher of courses: • Machine elements 1 and Machine elements 2 / undergraduate university study Mechanical engineering; • Machine elements / undergraduate university study Naval architecture, undergraduate vocational study Naval

	architecture and undergraduate university study Industrial engineering • Introduction to fracture mechanics and Mechanical drives / graduate university study Mechanical engineering • Integrity of machines and structures, Fracture mechanics and Machine Elements: Selected chapters / postgraduate university study Mechanical engineering
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Jelaska, Damir; Podrug, Srdjan; Perkušić, Milan., Kinematic Synthesis of a Novel Type of the Series of Transmissions with Independently Controllable Output Speed, Mechanism and Machine Theory, 103 (2016); 189-201 2. Jelaska Damir; Podrug Srdjan; Perkušić Milan., A novel hybrid transmission for variable speed wind turbines, Renewable energy, 83 (2015); 78-84 3. Jelaska Damir; Podrug Srdjan; Perkušić, Milan., Proposition of the series of transmissions having an independently controllable output speed, International Journal Advanced Engineering, 6 (2015), 1; 13-21 4. Jelaska, Damir; Podrug, Srdjan; Perkušić, MIlan. On the feasibility of the power split type transmissions having independently controllable output speed, International Journal of Advanced Engineering, 7 (2013) 5. Perkušić, Milan; Jelaska, Damir; Podrug, Srdjan, Estimation of fatigue life of involute gears, Strojarstvo, 54 (2012), 5; 381-391 (in croatian)
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Development of components life assessment procedures (Project MSES no. 023-0692195-1749), 2007.-2013.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Training for teachers and administrative staff in the EU project ME4CataLOgue (Mechanical Engineering for Catalogue)
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	• Average grade for the course Machine elements 1 at the undergraduate university study Mechanical engineering in the last five years: 4,73/5. • Grade for the course Machine elements 2 at the undergraduate university study Mechanical engineering in the last year: 4,9/5.

First and last name and title of teacher	**Gojmir Radica, Ph. D., Full Professor**
The course he/she teaches in the proposed study program	Ship Propulsion System, Engines and Vehicles, Cogeneration Power Plant Optimization, Thermal Power Plant
GENERAL INFORMATION ON COURSE TEACHER	
Address	Tolstojeva 43, 21000 Split
Telephone number	021 305955
E-mail address	gojmir.radica@fesb.hr
Personal web page	https://nastava.fesb.unist.hr/nastava/nastavnici/detalji/goradica
Year of birth	1962
Scientist ID	245370
Research or art rank, and date of last rank appointment	15.9.2010. scientific adviser
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	20.03.2013. Full professor
Area and field of election into research or art rank	Technical science, mechanical engineering, marine engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of electrical engineering mechanical engineering and naval architecture
Date of employment	1.10.2011.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Thermodynamic machines, marine engineering
Function	Professor
INFORMATION ON EDUCATION – Highest degree earned	
Degree	Doctor of Science in Mechanical Engineering
Institution	Postgraduate Studies, Faculty of Mechanical Engineering and Naval Architecture - University of Zagreb
Place	Zagreb
Date	21.06.2004.
INFORMATION ON ADDITIONAL TRAINING	
Year	1992
Place	Split, Croatia
Institution	Maritime faculty University of Split, Croatia
Field of training	Marine engineer
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English - 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian- 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German- 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Professional studies: – Thermal and hydraulic machines (430) – Marine propulsion (440)

	Undergraduate studies: – Thermal machines (130) – Marine engineering (140) – Marine machineries and devices (140) – Propulsion systems of small ships (140)) Graduate studies: – Power plant (260) – Thermal machines (270) – Ship propulsion systems (260) Doctoral study: - Expert systems for diagnostic
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	– Lalić, B., Radica, G., Račić, N.: Analysis of exhaust gas emission in the marine two stroke engine, Brodogradnja 67, 2016, ISSN 0007-215X – Jurić T., Radica G., Jelić M.: Experimental Method for Marine Engine's Emissions Analysis, Naše more, 2016, Dubrovnik; DOI 10.17818/NM/2016/1.4;UDK 629.5:621.43; – Grljušić, Mirko; Medica, Vladimir; Radica, Gojmir. Calculation of Efficiencies of a Ship Power Plant Operating with Waste Heat Recovery through Combined Heat and Power Production. // Energies. 8 (2015) , 5; 4273-4299 (članak, znanstveni) – Landeka, P., Radica, G..: Efficiency Increase in Ships Primal Energy System, THERMAL SCIENCE, Year 2016, Vol. 20, No. 2, pp. 1-8 – N. Račić, G. Radica, F. Lušić: Simulation of the marine engine performance with the purpose of predicting parameters, 6th. International Maritime Science Conference,IMSCpage 437-444; ISSN 1847-1498, 2014. – Hour by hour simulation of solar hydrogen energy system in conjunction with renewable energy sources; J. Simunovic, D. Bagaric, N. Goles, D. Bezmalinovic, I. Tolj, G. Radica, F. Barbir; 5th EUROPEAN PEFC & H2 FORUM June, 2015. Luzern Switzerland
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	– Barle, Jani; Franulović, Marina; Jurčević Lulić, Tanja; Kladarić, Ivica; Markučič, Damir; Radica, Gojmir. Izrada kataloga znanja, vještina i kompetencija za studije strojarstva u Republici Hrvatskoj // Zbornik radova međunarodne stručne konferencije ME4CataLOgue / Kozak, D., Barle, J., Markučič, D., Pavletić, D., Matičević, G, Vranešević M. N., Rosandić, Ž, Damjanović D. (ur.). Slavonski Brod : Strojarski fakultet u Slavonskom Brodu, 2014. 21-30 (plenarno predavanje,međunarodna recenzija,objavljeni rad,stručni).
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	– Repowering motor boat 2012-13
The name of the programme and the volume in which the main	– Implementacije ishoda učenja u razvoj studijskih programa i kurikuluma; Povezivanje ishoda učenja i metoda

teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences	poučavanja-Prof. dr. sc. Izabela Sorić, Odjel za psihologiju,Sveučilište u Zadru, i Doc. dr. sc. Slavica Šimić Šašić,Odjel izobrazbu učitelja i odgojitelja,Sveučilište u Zadru, ukupno 24 sata; u sklopu IPA IV projekt: "ME4CataLOgue - Hrvatski katalog znanja, vještina i kompetencija za studije strojarstva temeljen na ishodima učenja (za preddiplomski, diplomski i doktorski studij)", aktivni učesnik projekta od 9.2013-2.2015.
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Gold medal for patent on 8th Innovation fair INVENTUM 2014.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,8/5

First and last name and title of teacher	**Ante Rozga, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Probability and Statistics
GENERAL INFORMATION ON COURSE TEACHER	
Address	21000 Split, 166 Vukovarska
Telephone number	021 430-649
E-mail address	rozga@efst.hr
Personal web page	http://www.efst.unist.hr/o-fakultetu/fakultet/djelatnici/osoba/detalji/rozga
Year of birth	1951
Scientist ID	057876
Research or art rank, and date of last rank appointment	Scientific adviser, 2009
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor Tenure, 2014.
Area and field of election into research or art rank	Social Sciences, Economics. Quantitative Methods.
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Economics, University of Split
Date of employment	1.10. 1977.
Name of position (professor, researcher, associate teacher, etc.)	Professor.
Field of research	Quantitative Methods, Statistics. Multivariate Analysis. Survival Analysis. Statistical Methodology in Scientific Research.
Function	Professor.
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Economics.
Place	Split
Date	2001
INFORMATION ON ADDITIONAL TRAINING	
Year	1985/86
Place	London. U.K.
Institution	The London School of Economics and Political Science, Department of Statistics. Graduate studies.
Field of training	Statistics. The Analysis of Time Series.
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian.
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian, 5
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	French, 3
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme	1. Statistics. Undergraduate studies. Faculty of Economics, University of Split. 2. Statistical Analysis. Undergraduate studies. Faculty of

where it is/was offered, and level of study programme)	Economics, University of Split. 3. Biostatistics. Undergraduate and PhD studies. School of Medicine. University of Split. 4. Statistics. Graduate Studies. Faculty of Mechanical Engineering. University of Split. 5. Probability and Statistics. Faculty of Electrical Engineering. University of Split. 6. Statistical Methodology in Scientific Research. PhD Studies. Faculty of Economics, University of Split. 7. Multivariate Analysis. PhD Studies. Faculty of Economics, University of Split. 8. Statistical Methods in Forensics. Graduate Studies. School of Forensic Sciences. University of Split.
Authorship of university/faculty textbooks in the field of the course	1. Rozga A., (1994): *Statistička analiza*. Ekonomski fakultet Split. X+148 pages. 2. Rozga A., (2009): *Statistika za ekonomiste*. Ekonomski fakultet Split. X+336 pages. 3. Rozga A. and B. Grčić., (2009): *Poslovna statistika*. Ekonomski fakultet u Splitu. IX + 271 pages. 4. Pivac S. and A. Rozga., (2007): *Statistika za sociološka istraživanja*. Filozofski fakultet Sveučilišta u Splitu. 264 pages. 5. Pivac S. and A. Rozga., (2008): *Statistika za sociologe*. Filozofski fakultet Sveučilišta u Splitu. 231 pages.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Rozga A., E. Jurun and I. Šutalo (2013): *Correction od Chain-Linking Method by Means of Lloyd-Moulton-Fisher-Tornquist Index on Croatian GDP Data.* Croatian Operational Research Review. 2. Šerić N., A. Rozga and A. Luetić (2014): *Relationship between Business Intelligence and Supply Chain Management for Marketing Decisions.* Universal Journal of Industrial and Business Management, 2; 31-35. 3. Visković J., J. Arnerić and A. Rozga (2014): *Volatility Swiching Between Two Regimes.* International Journal of Social, Human Science and Engineering. Madrid. Spain. Madrid. ISNN: 1307-6892. Vol:9, no 3. 4. Arnerić, J., Čeh-Časni, A., Rozga, A. (2015): *Pre-adjustment Process of Real Retail Trade Series in Croatia*, The Business and Management Review, Vol. 6, No. 2, pp. 104-112, ISSN 2047-2854. 5. Poklepović, T., Aljinović, Z and Rozga, A (2016): *Moments Extraction from Implied Probability Distribution: Nonstructural Approach*. Proceedings of the 02nd International Conference on Business Management and Economics: 02nd ICBME 2016.
Professional and scholarly articles published in the last five years in	

subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Project: *Building of Macro econometric Model of Croatian Economy*, (code of the project: 055-0551147-1146). 2. Project *Quality Assurance in Higher Education.* UNESCO.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Damir Sedlar, Ph. D., Assistant Professor**
The course he/she teaches in the proposed study programme	Measurement and experimental analysis of vibration
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 32, 21000 Split
Telephone number	021/305-967
E-mail address	dsedlar@fesb.hr
Personal web page	http://marjan.fesb.hr/~dsedlar/
Year of birth	1976.
Scientist ID	248913
Research or art rank, and date of last rank appointment	Research scientist, March, 2013.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Assistant professor, September, 2012.
Area and field of election into research or art rank	Technical Sciences, field fundamentals technical sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	2001
Name of position (professor, researcher, associate teacher, etc.)	Assistant professor
Field of research	Dynamics, finite element method, noise and vibration, optimization
Function	
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	2009
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (3)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	

study programme)	
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	- Sedlar, Damir; Lozina, Željan; Vučina, Damir. An implementation of structural change detection procedure based on experimental and numerical model correlation. // Journal of sound and vibration. 331 (2012) - Lozina, Željan; Sedlar, Damir; Vučina, Damir. Model Update with Observer/Kalman Filter and Genetic Algorithm Approach. // Transactions of FAMENA. 36 (2012)
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	Me4CataLOgue
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Ivan Slapničar,, Ph.D., Full Professor**
The course he/she teaches in the proposed study programme	Mathematics – Special Topics
GENERAL INFORMATION ON COURSE TEACHER	
Address	FESB, R. Boškovića 32, B803
Telephone number	021 305893
E-mail address	ivan.slapnicar@fesb.hr
Personal web page	http://www.fesb.hr/~slap
Year of birth	1961
Scientist ID	30650
Research or art rank, and date of last rank appointment	scientific counselor
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Full Professor, permanent position, since 2008
Area and field of election into research or art rank	Area od Natural Sciences, Field of Mathematics
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	FESB, Split
Date of employment	1985
Name of position (professor, researcher, associate teacher, etc.)	Full Professor
Field of research	Mathematics
Function	Head of the Chair of Mathematics
INFORMATION ON EDUCATION – Highest degree earned	
Degree	dr. sc. (dr. rer. Nat.)
Institution	Fernuniversität Hagen
Place	Hagen, Germany
Date	October 1992
INFORMATION ON ADDITIONAL TRAINING	
Year	2014
Place	Cambridge, MA, USA
Institution	Massachusetts Institute of Technology
Field of training	Fulbright-Schuman International Educator/Lecturer Grant
Year	2009/2010
Place	Berlin, Germany
Institution	Technische Universität Berlin
Field of training	FP7 People "Marie Curie" Intra European Fellowship
Year	2001/2002
Place	Logan, UT, SAD
Institution	Utah State University
Field of training	Visiting Professor of Mathematics
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	

COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Lecturer of various courses since 1992.
Authorship of university/faculty textbooks in the field of the course	Ivan Slapničar, Matematika 1, FESB, Split, 2002. (Manualia Universitatis studiorum Spalatensis) Ivan Slapničar, Josipa Barić i Marina Ninčević, Matematika 2 – zbirka zadataka, FESB, Split, 2010. (Manualia Universitatis studiorum Spalatensis)
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Jakovčević Stor, Nevena; Slapničar, Ivan; Barlow, Jesse L. **Forward stable eigenvalue decomposition of rank-one modifications of diagonal matrices,** *Linear Algebra and its Applications*. **487** (2015) 301-315. 2. Jakovčević Stor, Nevena; Slapničar, Ivan. **Forward Stable Computation of Roots of Real Polynomials with Real Simple Roots**, *Applied Mathematics and Information Sciences*. **11** (2017) 33-41. 3. Jakovčević Stor, Nevena; Slapničar, Ivan; Barlow, Jesse L. **Accurate eigenvalue decomposition of real symmetric arrowhead matrices and applications,** *Linear algebra and its applications*. **464** (2015) 62-89. 4. Slapničar, Ivan. **Symmetric matrix eigenvalue techniques,** Handbook of Linear Algebra, Hogben, Leslie (ed.). Chapman & Hall / CRC, Boca Raton, 2013, pp. 55-1-55-23. 5. Slapničar, Ivan. **On the spectra of generalized Fibonacci and Fibonacci-like operators**., *Operators and Matrices*. ***6*** (2012) 49-62.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	1. Accurate and fast matriox algorithms and applications, project MZOS No. 372783-1289, 2007- 2013, principal investigator. 2. Optimization of parameter dependent mechanical systems, HRZZ research project No. 9540, 2015-2019, collaborator.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	Prize of the Fernuniversität Hagenu for the best disseration, 1992. Prize of the Croatian Mathematical Society Nagrada for the young scientist, 1996.
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Evaluations organized by the Quality Enhancement Centre of the University of Split each semester. Average grade is 4.5 on the 1-5 scale.

UBACITI SUTLOVIĆ ENCV

First and last name and title of teacher	**Marija Šiško Kuliš, Ph.D., Associate Professor**
The course he/she teaches in the proposed study programme	Assessment of technology projects Introduction to Entrepreneurship
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ilijin potok 16, 21210 Solin
Telephone number	098 414 732
E-mail address	marija.sisko-kulis@hep.hr
Personal web page	
Year of birth	1966.
Scientist ID	217703
Research or art rank, and date of last rank appointment	
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate Professor, May2011.
Area and field of election into research or art rank	Technical sciences, mechanical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	HEP Proizvodnja d.o.o., vanjski suradnik na Fakultetu strojarstva i brodogradnje u Splitu.
Date of employment	1.rujna 1994.
Name of position (professor, researcher, associate teacher, etc.)	Head of mechanical department at Hydro South
Field of research	Mechanical engineering, investment projects
Function	The manager and supervising engineer
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PHD
Institution	Faculty of Mechanical Engineering and Naval Architecture, Zagreb
Place	Zagreb.
Date	21.09.2000.
INFORMATION ON ADDITIONAL TRAINING	
Year	1998/1999; 1995-1997
Place	LJubljana
Institution	Turboinštitut
Field of training	Water turbine_management of project reconstruction of hydroelectric power plants
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Hrvatski
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Engleski – 4
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Njemački - 3
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	• Entrepreneurship, Professional Study of Mechanical Engineering, Electrical Engineering, University of Split, Department of Professional Studies, • Entrepreneurship in the media, professional study, TV Academy, Split.

	• Assessment of technological project- Graduate Studies, Industrial Engineering, FESB, Split.
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	•Šiško Kuliš, M. (2013.): Ispitivanje osposobljenosti menadžmeta za primjenu alata i tehnika upravljanja kvalitetom u tvrtkama elektro i metaloprerađivačke industrije Hrvatske, Zbornik radova, Međunarodna konferencije, Neum 2013. • Pleština, M, Šiško Kuliš, M. Vučina, D. (2013.): Analysis of investments in mall hydropower plants International Conference MTSM 2010 / Prof.dr. Dražen Živković (ur.). Split : Hrvatsko društvo za strojarske tehnologije, Hrvatska ; c/o FESB, 2013.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Refurbishment of Zakucac HPP
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	Average value 4.8

UBACITI TERZIĆ EN CV

First and last name and title of teacher	**Ivica Veža, Ph. D., Full Professor**
The course he/she teaches in the proposed study programme	Plant Layout
GENERAL INFORMATION ON COURSE TEACHER	
Address	Odeska 13, 21000 Split, HR
Telephone number	+385 21 305933
E-mail address	iveza@fesb.hr
Personal web page	
Year of birth	1951.
Scientist ID	095643
Research or art rank, and date of last rank appointment	Scientific Adviser - Mechanical Engineering, 08.03.2001. Scientific Adviser – Fundamental Technical Science 05.07.2006.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 23.01.1998.
Area and field of election into research or art rank	Technical Sciences, Field Industrial engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	1/1/1981
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Plant Layout, Organization, Production Engineering
Function	Head of Chair of Inudstrial Engineering
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Mechanical Engineering and Naval Architecture
Place	Zagreb
Date	9/11/2001
INFORMATION ON ADDITIONAL TRAINING	
Year	1983/84
Place	Stuttgart, Germany
Institution	University of Stuttgart, Fraunhofer – Institut fuer Produktiontechnik und Automatisierung
Field of training	Plant Layout, Simulation
INFORMATION ON ADDITIONAL TRAINING	
Year	1991
Place	Berlin, Germany
Institution	Technical University of Berlin, Fraunhofer IPK
Field of training	Design of Assembly Systems
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Germany (4)
Foreign language and command of foreign language on a scale from 2	

(sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Economics and Production Organisation, Undergraduate study programme,
Authorship of university/faculty textbooks in the field of the course	Veža, Ivica, Bilić, Boženko, Bajić, Dražen, "Projektiranje proizvodnih sustava", Fakultet elektrotehnike, strojarstva i brodogradnje, Split, 2001.
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Perić, Tunjo; Babić, Zoran; Veža, Ivica: Vendor selection and supply quantities determination in a bakery by AHP and fuzzy multi-criteria programming. International journal of computer integrated manufacturing. 26 (2013) , 9; 816-829 2. Veža, Ivica; Mladineo, Marko: SUSTAINABILITY THROUGH PRODUCTION NETWORKS. Management and Production Engineering Review. 4 (2013), 4; 33-39 3. Gjeldum, Nikola; Bilić, Boženko; Veža, Ivica. Investigation and modelling of process parameters and workpiece dimensions influence on material removal rate in CWEDT process. International journal of computer integrated manufacturing. 28 (2015) , 7; 715-728 4. Takakuwa, Soemon; Veža, Ivica: Technology Transfer and World Competitiveness. Procedia Engineering. 69 (2014); 121-127 5. Banduka, Nikola; Veža, Ivica; Bilić, Boženko: An integrated lean approach to Process Failure Mode and Effect Analysis (PFMEA): A case study from automotive industry. Advances in Production Engineering & Management. 11 (2016) , 4; 355-365
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	4. Gečevska, Valentina; Čuš, Franci; Chiabert, Paolo; Veža, Ivica: LINKING LEAN PRODUCTION WITH PRODUCT LIFECYCLE MANAGEMENT FOR SUSTAINABLE BUSINESS ENVIRONMENT, DEVELOPMENT OF INTELLIGENT AND INNOVATIVE TOOLS FOR PRODUCTION PROCESS ENGINEERING AND SUSTAINABLE MANAGEMENT, Čuš, F.; Gečevska, V. (Ed.). Maribor, Slovenija: Faculty of Mechanical engineering, Maribor, 2013. 19-39. 5. Čelar, Stipe; Turić, Mili; Dragičević, Srdjana; Veža, Ivica. Digital Learning Factory at FESB – University of Split , ZBORNIK RADOVA YU INFO 2016, 2016. 001-006 6. Veža, Ivica; Gjeldum, Nikola; Mladineo, Marko: Logistics Personal Excellence by Continuous Self-Assessment (LOPEC): Pilot Implementation - Case Studies. Conference Proceedings - MTSM 2014, Split, 2014. 39-46 7. Stojkić, Željko; Veža, Ivica; Bošnjak, Igor. CONCEPT OF INFORMATION SYSTEM IMPLEMENTATION (CRM AND ERP) WITHIN INDUSTRY 4.0, Proceedings of the 26th DAAAM International Symposium, Vienna, DAAAM International, 2016. 912-919
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	4. 2008 – 2013 Project TEMPUS-2008-IT-JPCR 144 959, Master Study Program in Product Lifecycle Management with Sustainable Production 5. 2011-2014 LEONARDO DA VINCI Project "LOPEC - Logistics personnel excellence by continuous self-assessment", FESB Split, University of Reutlingen

	6. 2013-2016 Network of Innovative Learning Factories NIL, "System - Learning Factory", FESB, Split, University of Reutlingen 7. 2013-2016 Know-how Exchange on the Consequences and Challenges of the Integration of Key Enabling Technologies in European Manufacturing for the Danube Region, Fraunhofer Institute for Systems and Innovation Research ISI – Karlsruhe 8. 2014-2018 Innovative Smart Enterprise, INSENT, Croatian Science Foundation, Zagreb
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,8/5

First and last name and title of teacher	**Frane Vlak, Ph. D., Associate Professor**
The course he/she teaches in the proposed study programme	Mechanics of Materials 3
GENERAL INFORMATION ON COURSE TEACHER	
Address	Ruđera Boškovića 32
Telephone number	021305971
E-mail address	fvlak@fesb.hr
Personal web page	
Year of birth	1968.
Scientist ID	233385
Research or art rank, and date of last rank appointment	Scientific Adviser, 11/11/2015
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Associate Professor, 29/9/2011
Area and field of election into research or art rank	Technical Sciences, Field Electrical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	6/6/1995
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Mechanics of deformable solids
Function	Head of Chair of Mechanics
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	13/1/2006
INFORMATION ON ADDITIONAL TRAINING	
Year	
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (2)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Technical mechanics 1, Mechanics of materials: Professional studies of mechanical engineering and naval architecture, Undergraduate study programme Mechanics of materials and 2: University studies of mechanical engineering, naval architecture and industrial engineering,

	Undergraduate study programme
Authorship of university/faculty textbooks in the field of the course	
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Barle, Jani; Grubišić, Vatroslav; Vlak, Frane. Failure analysis of the highway sign structure and the design improvement. // Engineering failure analysis. 18 (2011) , 3; 1076-1084 (članak, znanstveni). 2. Vlak, Frane; Cvitanić, Vedrana; Vučina, Damir. An approach for reduction of the volume loss in the rigid-plastic FEM using two-step updating procedure. // International journal of mechanical sciences. 53 (2011) , 10; 839-845 (članak, znanstveni). 3. Pavazza, Radoslav; Vlak, Frane; Vukasović, Marko. Bending and torsion of stiffeners with L sections under the plate normal pressure // Advanced Ship Design for Pollution Prevention / Soares, Guedes C. ; Parunov, Joško (ur.). London : CRC Press/Balkema, Taylor & Francis Group, 2010. Str. 121-127. 4. Vlak, Frane; Pavazza, Radoslav; Vukasović, Marko. An approximate analytic solution for the stresses and displacements of thin-walled orthotropic beams subjected to bending // 16th European Conference on Composite Materials ECCM16-Conference Proceedings-Seville, Spain: University of Seville, Spain, 2014. / Paris, Federico (ur.). Seville : University of Seville, 2014. 1-8 (predavanje,međunarodna recenzija,objavljeni rad,znanstveni). 5. Pavazza, Radoslav; Matoković, Ado; Vlak, Frane. An analytical solution for displacements and stresses for mono symmetrical stiffend plate structures under transverse loads // Knjiga sažetaka XX. simpozija Teorija i praksa brodogradnje in memoriam prof. Leopold Sorta / Žiha, Kalman (ur.). Zagreb : Fakultet strojarstva i brodogradnje, Brodarski institut d.o.o., 2012. 76-76 (predavanje,međunarodna recenzija,objavljeni rad,znanstveni).
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	9.
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	ME4CataLOgoue (Mechanical Engineering for Catalogue) Croatian Catalogue of knowledge, skills and competences for Mechanical Engineering studies (Bachelor, Master and Doctoral study programmes) based on learning outcomes
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	
Results of student evaluation taken in the last five years for the course that is comparable to the course	

described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	

First and last name and title of teacher	**Damir Vučina, Ph. D. Full Professor**
The course he/she teaches in the proposed study programme	Optimization methods
GENERAL INFORMATION ON COURSE TEACHER	
Address	FESB, R. Boškovića 32, 21000 Split
Telephone number	021 305 969
E-mail address	vucina@fesb.hr
Personal web page	
Year of birth	1962
Scientist ID	129716
Research or art rank, and date of last rank appointment	Scientific Adviser, 2005
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 2005
Area and field of election into research or art rank	Technical Sciences, Fundamental Technical Sciences
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	1985
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	Numerical methods in engineering and optimization
Function	Head of group for modeling and computer-aided analysis
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Fakultet strojarstva i brodogradnje
Place	Zagreb
Date	1993
INFORMATION ON ADDITIONAL TRAINING	
Year	Fulbright grant, Columbia University New York Several courses at CISM Italy
Place	
Institution	
Field of training	
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (5)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of	Computer.aided analysis Optimization methods Programming Graduate courses

study programme)	
Authorship of university/faculty textbooks in the field of the course	D. Vučina, 'Metode inženjerske numeričke optimizacije', Sveučilište u Splitu, FESB 2005 Damir Vučina, 'Primjena računala u inženjerskoj analizi', FESB, 2007
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	**p1.** Ćurković, M.; Vučina, D. 3D Shape acquisition and integral compact representation using optical scanning and enhanced shape parameterization. Advanced engineering informatics. 28 (2014) , 2; 111-126, IF 2.086. **p2.** Vučina, D.; Ćurković, M.; Novković, T. CLASSIFICATION OF 3D SHAPE DEVIATION USING FEATURE RECOGNITION OPERATING ON PARAMETERIZATION CONTROL POINTS. // Computers in industry. 65 (2014) , 6; 1018-1031. IF 1.457. **p3.** Milas, Zoran; Vučina, Damir; Marinić-Kragić, Ivo. MULTI-REGIME SHAPE OPTIMIZATION OF FAN VANES FOR ENERGY CONVERSION EFFICIENCY USING CFD, 3D OPTICAL SCANNING AND PARAMETERIZATION. // Engineering Applications of Computational Fluid Mechanics. 8 (2014), 3; 407-421. IF 0.921. **p6.** Vučina, D.; Lozina, Ž.; Pehnec, I. Ad-Hoc Cluster and Workflow for Parallel Implementation of Initial-Stage Evolutionary Optimum Design. Structural and multidisciplinary optimization. 45 (2012) , 2; 197-222. IF 1.488. **p5.** Vučina, D.; Lozina, Ž.; Pehnec, I. Computational procedure for optimum shape design based on chained Bezier surfaces parameterization. Engineering applications of artificial intelligence. 25 (2012) , 3; 648-667. IF 1.665.
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	s.a.
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	s.a..
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	continuously
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	1. Columbia University, New York, USA, 1986- 1987, dobitnik US Fulbright stipendije 2. Sveučilište u Splitu, za tehničke znanosti, 2014
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course	excellent

evaluated)	

First and last name and title of teacher	**Dražen Živković, Ph.D. Full professor**
The course he/she teaches in the proposed study programme	Heat treatment and surface protection
GENERAL INFORMATION ON COURSE TEACHER	
Address	Rovinjska 4, 21000 Split, Republic of Croatia
Telephone number	+385 21 305910
E-mail address	Drazen.Zivkovic@fesb.hr
Personal web page	/
Year of birth	1957.
Scientist ID	044701
Research or art rank, and date of last rank appointment	Scientific Adviser, 21/01/2009.
Research-and-teaching, art-and-teaching or teaching rank, and date of last rank appointment	Senior Full Professor, 05/06/2014
Area and field of election into research or art rank	Technical Sciences, Field: Mechanical engineering
INFORMATION ON CURRENT EMPLOYMENT	
Institution where employed	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Date of employment	13/09/1983.
Name of position (professor, researcher, associate teacher, etc.)	Professor
Field of research	
Function	Head of Mechanical Engineering Technology Department
INFORMATION ON EDUCATION – Highest degree earned	
Degree	PhD
Institution	Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture
Place	Split
Date	04/09/1999.
INFORMATION ON ADDITIONAL TRAINING	
Year	/
Place	/
Institution	/
Field of training	/
MOTHER TONGUE AND FOREIGN LANGUAGES	
Mother tongue	Croatian
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	English (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	Italian (4)
Foreign language and command of foreign language on a scale from 2 (sufficient) to 5 (excellent)	German (2)
COMPETENCES FOR THE COURSE	
Earlier experience as course teacher of similar courses (name title of course, study programme where it is/was offered, and level of study programme)	Materials, , Basic of Tribology (530) Materials 1, Materials 2, Technology 1, Tribology, (130, 140, 150) Heat treatment and surface protection (263)

Authorship of university/faculty textbooks in the field of the course	Dražen, Živković: Lijevanje, ISBN 978-953-6114-91-7
Professional, scholarly and artistic articles published in the last five years in the field of the course (5 works at most)	1. Živković, Dražen; Gabrić, Igor; Šitić, Slaven. Popravak zavarivanjem konstrukcija iz titanovih legura. // Strojarstvo. 53 (2011) , 4; 319-326 2. Živković, Dražen; Gabrić, Igor; Šitić, Slaven. Utjecaj niskog i visokog popuštanja na tvrdoću čelika EN 42CRM04. // Tehnički glasnik. 6 (2012) 3. Živković, Dražen; Gabrić, Igor; Šitić, Slaven. Analiza utjecaja parametara toplinske obrade na tvrdoću čelika EN 42CrMo4 // MATRIB 2012 materials/tribology/recycling : zbornik radova = conference proceedings / Željko Alar, Suzana Jakovljević (ur.). Zagreb : Hrvatsko društvo za materijale i tribologiju, 2012. 379-386 4. Živković, Dražen; Gabrić, Igor; Šitić, Slaven. Utjecaj toplinske obrade na dinamičku izdržljivost čelika EN 42CrMo4 // International conference Heat Treatment and Surface Engineering - European Opportunities for Croatian Economy : proceedings book = Međunarodno savjetovanje Toplinska obrada i inženjerstvo površina - europske mogućnosti hrvatskog gospodarstva : zbornik radova / Smojan, Božo ; Iljkić, Dario (ur.). Rijeka : Hrvatsko društvo za toplinsku obradu i inženjerstvo površina, 2012. 67-74 5. Ljumović, Petar; Živković, Dražen; Dadić, Zvonimir; Gabrić, Igor. IZBOR MATERIJALA KALUPA ZA VISOKOTLAČNO LIJEVANJE // MATRIB 2014, materials, tribology, recycling / Šolić, Sanja ; Šnajder Musa, Matea (ur.). Zagreb : Hrvatsko društvo za materijale i tribologiju, 2014. 307-317
Professional and scholarly articles published in the last five years in subjects of teaching methodology and teaching quality (5 works at most)	/
Professional, science and artistic projects in the field of the course carried out in the last five years (5 at most)	Projekt: „Računalno optimiranje parametara termalnih procesa obrade metala“, voditelj prof.dr.sc. Božo Smoljan
The name of the programme and the volume in which the main teacher passed exams in/acquired the methodological-psychological-didactic-pedagogical group of competences?-pedagoške kompetencije?	/
PRIZES AND AWARDS, STUDENT EVALUATION	
Prizes and awards for teaching and scholarly/artistic work	/
Results of student evaluation taken in the last five years for the course that is comparable to the course described in the form (evaluation organizer, average grade, note on grading scale and course evaluated)	4,8/5

3.4. Optimal number of students

The admission quote for the first year of studies is 60.

3.5. Estimate of costs per student

Annual costs of studies per student amount to HRK 25,000.00.

3.6. Plan of procedures of study programme quality assurance

In keeping with the European standards and guidelines for internal quality assurance in higher education institutions (according to "Standards and Guidelines of Quality Assurance in the European Higher Education Area") on the basis of which the University of Split defines procedures for quality assurance, the proposer of the study programme is obliged to draw up a plan of procedures of study programme quality assurance.	
Documentation on which the quality assurance system of the constituent part of the University is based:	
• Regulations on the quality enhancement system of FESB	
• Quality Assurance Handbook of the constituent part	
Description of procedures for evaluation of the quality of study programme implementation: • For each procedure the method needs to be described (most often questionnaires for students or teachers, and self-evaluation questionnaire), name the body conducting evaluation (constituent part, university office), method of processing results and making information available, and timeframe for carrying out evaluation • If procedure is described in an attached document, name the document and the article.	
Evaluation of the work of teachers and part-time teachers	• Student evaluation of quality of instruction and teaching activities conducted through student survey (printed questionnaires) • Survey is organised and conducted by the Quality Enhancement Committee of the Faculty (Committee) • Survey results are processed automatically at the University • Survey is conducted each semester • The Committee presents cumulative results of the survey at the sessions of the Faculty Council. The report is published at the Faculty web site. All procedures are conducted in accordance with the Regulations on organisation and role of the quality assurance system of the University of Split, Regulations on procedure of student evaluation of the quality of teachers and teaching of the University of Split and Regulations on the quality enhancement system of FESB.
Monitoring of grading and harmonization of grading with anticipated learning outcomes	Committee for study programmes in Mechanical Engineering, Naval Architecture and Industrial Engineering is monitoring the harmonisation of grading and learning outcomes. All the procedures are conducted in accordance with the Rules of procedure of the Faculty Council and the Rules of procedure of the Department, since the Committees for study programmes are bodies of the Faculty Council and

	are accountable to the Faculty Council.
Evaluation of availability of resources (spatial, human, IT) in the process of learning and instruction	• Student evaluation of work performance of administrative and supporting services, learning infrastructure and student life is conducted through e-survey • Evaluation is conducted using an on-line questionnaire which the students complete in each year of study, except the final year • Survey is organised by the Quality Enhancement Centre of the University of Split, and is implemented by the Quality Enhancement Committee of the Faculty (Committee) • Survey results are processed automatically at the University • Survey is conducted every year • Survey results are presented at the Faculty Council sessions and published at the Faculty web site.
Availability and evaluation of student support (mentorship, tutorship, advising)	• Administrative and supporting services are available to students to provide support in their study activities • Supervisors/ mentors are appointed for students' final papers and diploma thesis
Monitoring of student pass/fail rate by course and study programme as a whole	• Analysis of student pass rate by courses and study programmes is carried out once a year • Analysis of pass rate by study programmes is carried out by the University in cooperation with the Committee • Analysis by courses and study programmes is carried out by the Faculty Management Board • Results of both analyses are presented at the Faculty Council sessions and published at the Faculty web site.
Student satisfaction with the programme as a whole	• Student evaluation of work performance of administrative and supporting services, learning infrastructure and student life is conducted through e-survey • Evaluation is conducted using an on-line questionnaire which the students complete following the completion of studies • Survey is organised by the Quality Enhancement Centre of the University of Split, and is implemented by the Quality Enhancement Committee of the Faculty (Committee) • Survey results are processed automatically at the University • Survey results are presented at the Faculty Council sessions and published at the Faculty web site.
Procedures for obtaining feedback from external parties (alums, employers, labour market and other relevant organizations)	• Once every month, the Faculty Management Board meets with the alumni representatives • Once a year, during the annual FESB anniversary event, round tables and workshops are organised with representatives of employers and other stakeholders
Evaluation of student practical education (where this applies)	Student training is not a mandatory part of the programme. Some of the students complete elective-based training abroad
Other evaluation procedures carried out by the proposer	• Internal audit of the quality assurance system is conducted once every year • Self-evaluation is carried out every 5 years All the procedures are conducted in line with the Quality

	Assurance Handbook of FESB.
Description of procedures for informing external parties on the study programme (students, employers, alums)	• All information are available through the Faculty web site: https://www.fesb.hr • Visits to the faculty are organised for high-school students from Split and the wider region • Participation at University fairs • Public media presentations