



University of Rijeka
Faculty of Engineering



CURRICULUM PROFESSIONAL UNDERGRADUATE STUDY OF MECHANICAL ENGINEERING

Rijeka, September 2026

1. CURRICULUM DESCRIPTION

1.1. The list of compulsory and elective courses with the number of active classes required for their performance and ECTS credits

1. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Mathematics I	2	3			5	7
	Mechanics I	3	1		1	5	7
	Materials	2	1	1		4	6
	Fundamentals of Electrical Engineering	2		1		3	5
	Applied Computing VO	2		2		4	5
	TOTAL					21	30

L - lectures, aT – auditory tutorials, IT – laboratory tutorials, dT – design tutorials.

2. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Mathematics II	2	3			5	7
	Mechanics II	2	1		1	4	6
	Strength of Materials	2	1	1		4	6
	Technical Drawing	2			2	4	6
	Manufacturing Technology I	2		1		3	5
	TOTAL					20	30

3. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Organization and Economics	2	1			3	4
	Fluid Mechanics VO	2	1			3	5
	Thermodynamics	3	1			4	6
	Manufacturing Technology II	3			1	4	6
	Machine Elements I	3			1	4	6
	Foreign Language I ¹	1	1			2	3
	TOTAL					20	30

¹ elective: English or German - free choice

4. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Machine Elements II	3			1	4	6
	Machine Tools	2		1		3	5
	Heat Engines and Devices I	2	1			3	5
	Foreign Language II ¹	1	1			2	3
	Professional Practice I						5
Subject from elective group A:							
	Heating and Air Conditioning Systems	3	1			4	6
Subject from elective group B:							
	Tools, Jigs and Fixtures	2			2	4	6
Subject from elective group C:							
	Energy Engineering in Process Industry	3	1			4	6
	TOTAL					16	30

5. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Measuring Technology VO	2			1	3	5
	Heat Engines and Devices II	2	1			3	5
	Hydraulic Machines VO	2	1			3	5
	Welding Engineering	2		1		3	5
Subjects from elective group A:							
	Engineering Design	3			1	4	5
	Fundamentals of Mechatronics	3		1		4	5
Subjects from elective group B:							
	Technological Processes	2	1		1	4	6
	Production Organization and Control	3	1			4	4
Subjects from elective group C:							
	Protection of the Environment and Working Ambient	3	1			4	5
	Process Equipment and Devices	3	1			4	5
	TOTAL					20	30

6. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Free Elective Subject					4	5
	Professional Practice II						10
	Final Work						10
Subject from elective group A:							
	Ship Systems and Marine Auxiliary Machinery	2	1	1		4	5
Subject from elective group B:							
	Manufacturing Systems	2	1		1	4	5
Subject from elective group C:							
	Technological Processes in Process Industry	3	1			4	5
TOTAL						8	30

Free Elective Subject							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Hydraulics and Pneumatics	3		1		4	5
	Automation VO	3	1			4	5
	Quality Assurance VO	3			1	4	5
	Ship Design	2			2	4	5
	Radiocommunications VO	3	1			4	5

PROFESSIONAL UNDERGRADUATE STUDY OF	Hours	ECTS
MECHANICAL ENGINEERING TOTAL	105	180

GENERAL INFORMATION		
Course name	Automation VO	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. Course aims		
Understanding the basic principles of automation and its impact on economic and social development.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Describe the historical development of automation, define the reasons for the introduction of automation and describe the advantages and disadvantages of automation. Define the level of automation and explain the means of automation of manufacturing and service activities. Describe the methods and strategies of automation. Define a methodology for analysis and synthesis of flexible and intelligent systems. Describe the self-organizing system, explain the structure, function, advantages and disadvantages, and describe the evolution of automated devices, machines and systems. Describe case studies of automated devices, machines and systems and define scenarios and strategies of leadership. Describe the current status and development trends of automation and describe barriers to development and forecasting.		
1.4. Course content		
Historical review of the automatic circuits, devices and machines. Ancient and medieval automata. Five levels of automation: assembly, device, machine, system and plant. Automation of manufacturing and service activities. Modern means of automation of production: digital computers, manipulators, robots. Automation strategy. Leading ideas and methodology of synthesis of flexible and intelligent systems. Artificial Intelligence. Self-organizing and autonomous systems. Economic and social aspects of automation of human activities. Selected examples of modern automated machines and systems. Current scientific research projects. Present status and development trends of automation.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		
Attendance, activities in the classroom, homework and self-study.		
1.7. Monitoring student work (mark the appropriate boxes with an X)		

GENERAL INFORMATION		
Course name	Applied Computing VO	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	1.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+30+0
Course description		
1.1. <i>Course aims</i>		
Obtaining knowledge and practical skills for the effective use of modern computer technologies in academic and engineering environments. Use of operating systems, Internet services, web browsers, and electronic communication. Creation, formatting, and presentation of professional and technical documents, data processing, analysis and visualization, and database management. Application of computational tools for mathematical and engineering calculations, as well as an introduction to basic digital image processing techniques.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Upon successful completion of the course, students will be able to: • Use operating systems, Internet services, and electronic communication tools effectively and responsibly. • Create, format, and present professional and technical documents and presentations. • Organize, process, analyze, and visualize data using appropriate computational tools. • Create and manage simple databases and perform basic data operations and queries. • Apply mathematical and computational tools to solve basic engineering problems. • Apply basic digital image processing techniques and select appropriate computer tools for academic and engineering tasks.		
1.4. <i>Course content</i>		
The course introduces students to the effective use of computer technologies and software tools in academic and engineering environments. Topics include: • Fundamentals and practical use of operating systems, including graphical and command-line environments. • Use of Internet services, web browsers, and electronic communication, including principles of effective and responsible digital communication. • Creation and formatting of professional, scientific, and technical documents, including structured documents, mathematical expressions, tables, figures, references, and automated document elements. • Preparation and delivery of technical presentations, with emphasis on clear organization and effective visual communication. • Data organization, processing, analysis, and visualization using spreadsheet-based tools, including formulas, functions, charts, and basic data analysis. • Fundamentals of database systems, including data organization, tables, relationships, queries, and basic database management. • Application of mathematical and computational tools for numerical calculations, data analysis, visualization, and solving basic engineering problems.		

- Fundamentals of digital image processing, including image representation, basic transformations, enhancement, filtering, and analysis. - Selection and integration of appropriate computer tools for solving academic and engineering tasks.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Class attendance, attendance at laboratory exercises, and completion of assessment tests.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							
Active participation in class, laboratory exercises, continuous assessment, written examination.							
1.9. Required readings and number of copies relative to the number of students currently taking the course							
Title					Number of copies		Number of students
Alajbeg, T.; Sokele, M.; Brkić, F.; Sokele, M.; Brkić, F.: Primjena osobnih računala u elektrotehnici udžbenik, Zagreb, 2020.					5		20
Monsalve-Pulido, J.; Aguilar, J.; Montoya, E.; Salazar, C., Applied Computing and Informatics, Emerald, 2024					8		20
1.10. Supplementary readings							
1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Energy Engineering in Process Industry	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	2.	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. Course aims		
Acquisition of theoretical knowledge and develop the skills needed to solve technical problems in the design phase, construction and management of energy systems.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Describe the changes of the working fluid conditions in energy processes. Draw thermodynamic diagrams of working fluid in energy processes. Define losses of energy and exergy in the energy processes. Calculate energy losses and efficiency of energy processes. Calculate the main values of energy processes. Develop a basic scheme of energy systems in process industry. Define the main parameters and size of energy systems. Analyze the influential parameters of energy processes. Define and explain the operational costs of power plants. Define the ways to increase efficiency of energy systems. Explain the principles of rational production and use of energy. Describe the sources and ways to reduce the pollution in energy plants.		
1.4. Course content		
The introduction about the energy and energetics. The role of energy in the process industry, types of energy, main features of energy, thermodynamic analysis of energy processes, value of energy and exergy, efficiency of energy processes. Energy systems in process industry, steam turbine systems, gas turbine systems, cogeneration energy systems, combined energy systems, integrated energy systems, modes for improvement of efficiency, influencing factors of economical operation, analysis of operational costs. Rational production and use of energy, modes to improve efficiency of energy processes, influencing factors for economical operation, analysis of costs, optimization of energy production. Environmental protection in energy plants.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		
Course attendance, Activity, Studying		
1.7. Monitoring student work (mark the appropriate boxes with an X)		

Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Course attendance, activity, continuous knowledge testing (2 mid-term exams), written and oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies	Number of students	
Prelec, Z.: Energy in process industry (book), Školska knjiga Zagreb, 1994. (in Croatian)					10		
1.10. <i>Supplementary readings</i>							
El-Vakil, M.: Power plant technology, Mc Graw Hill Book Company, 1988. Reis A., Smith I.: Energy Economic and Management in Industry, Vol. 1, Vol. 2, Pergamon Press 1984.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Engineering Design	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. <i>Course aims</i>		
The aim of the course is to enable students to develop and design technical products by applying sound engineering design principles. In developing a design, students will integrate functional requirements, loading and material selection with manufacturing, assembly, maintenance and transport considerations, as well as requirements related to safety, ergonomics, cost-effectiveness, standardization and environmental protection.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Distinguish between different design approaches and principles and identify the stages of the engineering design process. Design machine components in accordance with requirements related to maintenance, environmental protection, cost-effectiveness and standardization. Design machine components with regard to the intended manufacturing and processing technology, taking into account their function, loading, material, dimensions and mass, ergonomics, assembly and transport. Solve an engineering design problem by applying appropriate calculations and detailed design development of a machine component or assembly.		
1.4. <i>Course content</i>		
Engineering design process and types of designs. Requirements to be met by a design. Basic principles of sound engineering design. Design with regard to function, loading, strength and stiffness. Allowable stresses. Stress concentrations under static and dynamic loading. Material selection. Design with regard to material, mass, friction, wear and corrosion. Design with regard to safety, ergonomics, maintenance, cost-effectiveness, environmental impact and recycling. Standardization and interchangeability. Tolerances and fits. Design with regard to assembly and transport. Design for manufacturing of castings, forgings and welded structures, as well as parts manufactured from sheet metal and by machining. Design of parts for additive manufacturing. Application of computer-aided tools in the design development of technical products. Application of sound engineering design principles in the development of the design assignment.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		

Class attendance and active participation. Completion of the engineering design assignment. Independent study and preparation for knowledge assessments.
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1.7. Monitoring student work (mark the appropriate boxes with an X)

Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project	x	Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. Assessment and evaluation of student work during classes and the final exam

Active class participation. Assessment of knowledge through midterm examinations. Evaluation of the design assignment based on the correctness of the applied calculations, the functionality and technical justification of the design solution, the application of sound design principles, the quality of the design development, and the completeness and correctness of the technical documentation. Written assessment of acquired knowledge in the final examination.

1.9. *Required readings and number of copies relative to the number of students currently taking the course*

Title	Number of copies	Number of students
Križan, B.: Fundamentals of the Calculation and Design of Machine Elements (In Croatian), University of Rijeka, 2008.	15	8
Križan, B., Franulović, M. Zelenika, S.: Machine Elements Design - Exercises' Collection: Fundamentals, Joints, Shafts and Axels (In Croatian), University of Rijeka, 2012.	35	8

1.10. <i>Supplementary readings</i>

Obersmit, E.: Fundamentals of Design (In Croatian), Sveučilišna naklada, Zagreb, 1991.

1.11. *Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.*

Through the Institution's quality assurance system.

GENERAL INFORMATION							
Course name	English Language I						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient				3		
	Number of hours (L+P+S)				15+15+0		
Course description							
1.1. Course aims							
Students should be able to use general purpose English as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level).							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Students should be able to: compare general with technical English on the basis of selected texts and topics; implement grammatical structures and aspects in speaking and writing; recognize terminology, key words and/or information in selected texts as well as differentiate and analyse relevant elements in them; describe and interpret accurately simple diagrams, charts, figures and mathematical formulae; present the advantages and disadvantages in covered units.							
1.4. Course content							
Topics: Engineering profession. Branches of engineering. Mathematical expressions, formulae and symbols, General principles of dynamics. Energy and forms of energy. Renewable and unrennewable energy sources. Heat and temperature. Computer essentials. Speaking skills (giving presentations) and writing skills (e-mail, CV). Specific grammatical and language structures (tenses, passive voice, modal verbs, articles, nouns, word formation) will be covered within individual thematic units.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Attendance, activity in class and independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	

Portfolio						
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>						
Attendance, seminar paper, continuous assessment of knowledge, written exam.						
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>						
Title					Number of copies	Number of students
Velčić Janjetić E.: Radni materijal za Engleski jezik I (stručni studij)					available on Merlin	
1.10. <i>Supplementary readings</i>						
Ibbotson, M.: Professional English in Use. Engineering. Cambridge University Press 2009.						
Ibbotson, M.: Cambridge English for Engineering. Cambridge University Press 2015.						
Glendinning, E. H. & Glendinning, N.: Oxford English for Electrical and Mechanical Engineering. Oxford University Press 2001.						
Vince, M.: Intermediate Language Practice. Heinemann ELT. Oxford 1998.						
Paterson, K. & Wedge, R.: Oxford Grammar for EAP. Oxford University Press 2013.						
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>						
Through the Institution`s Quality Assurance System.						

GENERAL INFORMATION							
Course name	English Language II						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient				3		
	Number of hours (L+P+S)				15+15+0		
Course description							
1.1. <i>Course aims</i>							
Students should be able to use professional jargon independently, namely communicate with other experts in the field of the engineering profession and in an international environment, at the B2 level of the Common European Framework of Reference for Languages.							
1.2. <i>Course enrolment requirements</i>							
None							
1.3. <i>Intended course learning outcomes</i>							
Students should be able to: recognize and explain grammatical structures typical of the vocational jargon; implement grammatical structures in speaking and writing activities; analyse and differentiate terminology and relevant elements in texts; paraphrase certain relevant parts in the text; write summaries of the text, arguments and definitions; analyse and describe complex diagrams, charts, figures and processes, express one's point of view and evaluate solutions of given problems.							
1.4. <i>Course content</i>							
Topics: Fluids. Materials in engineering. Material properties. Material processing. Heat treatment. Machining. Non-mechanical joints. Load, stress and strain. Computers in engineering. Engine fundamentals. Presentation skills, Offering feedback and peer assessment, Writing skills. Specific grammatical and language structures (adjectives and comparison of adjectives, relative clauses, participles (-ing/-ed), word formation, prefixes and suffixes, conditional clauses) will be covered within individual thematic units.							
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. <i>Student obligations</i>							
Attendance, activity in class and independent learning.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Attendance, seminar paper, continuous assessment of knowledge, written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Velčić Janjetić E.: Radni materijal za Engleski jezik II (stručni studij)					available on Merlin		
1.10. <i>Supplementary readings</i>							
Ibbotson, M.: Professional English in Use. Engineering. Cambridge University Press 2009. Ibbotson, M.: Cambridge English for Engineering. Cambridge University Press 2015. Glendinning, E. H. & Glendinning, N.: Oxford English for Electrical and Mechanical Engineering. Oxford University Press 2001. Vince, M.: Intermediate Language Practice. Heinemann ELT. Oxford 1998. Paterson, K. & Wedge, R.: Oxford Grammar for EAP. Oxford University Press 2013.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution`s Quality Assurance System.							

GENERAL INFORMATION							
Course name	Final Work						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	3.						
Number of credits and mode of delivery	ECTS student workload coefficient			10			
	Number of hours (L+P+S)			-			
Course description							
1.1. Course aims							
The Final Work is an individual assignment and verification of student vocational knowledge, which should show the appropriate level of engineering skills for individually solving specific professional tasks.							
1.2. Course enrolment requirements							
Enrolled course from which the Final Work is selected.							
1.3. Intended course learning outcomes							
Apply acquired knowledge and skills of the vocational content of Final Work course. Solve practical task. Acquire competence for individually solving specific professional task.							
1.4. Course content							
The content of the Final Work is based on the application of acquired knowledge from educational programs at the undergraduate vocational studies. Final thesis can be specified from a particular course specific vocational content and exceptionally from course that belongs to the group of shared vocational content, when it represents a broader entity with a particular course specific vocational content of the studies. Student enrollers the Final Work by enrolling the last semester. Thesis of the Final Work is establishes by Commission for Final Works, based on suggestion of teacher who will mentor the Final Work.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☐ lectures ☐ seminars and workshops ☐ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☒ supervision ☐ other _____		
1.6. Student obligations							
Attending the consultation, individually solving task and writing the Final Work report.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance		Participation in class		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Continuous assessment of knowledge		Student report		Practical work	
Portfolio			x		x		

1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>		
Assesses and evaluates the accuracy and completeness of a given task solving process, the Final Work written report, and its oral presentation		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
-		
1.10. <i>Supplementary readings</i>		
-		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION		
Course name	Fluid Mechanics VO	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	2.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+15+0
Course description		
1.1. Course aims		
Obtaining theoretical knowledge and develop skills to solve practical problems in the field of fluid mechanics.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Define and describe fluid properties such as density, pressure, viscosity, surface tension. Describe and apply the Euler equation of fluid statics. Analyse and describe various pressure measurement devices. Analyse and describe relative fluid movement under constant linear and rotational acceleration. Describe and apply fluid pressure on flat surfaces. Describe and analyse buoyancy and stability. Define and describe the following equations: Conservation of Mass - The Continuity Equation, The Linear Momentum and Moment of Momentum Equations with the Bernoulli equation, The Energy Equation with the modified Bernoulli equation. Define and analyse velocity and streamlines, streaklines and pathlines. Describe control volume and control surface. Define and describe laminar and turbulent flow, transition from laminar to turbulent flow, turbulent velocity profile, Reynolds number (Moody Chart) and other numbers important for Fluid Mechanics. Analyse pipe flow with minor and friction losses using Darcy Weisbach equation, parallel pipes, pipes in series.		
1.4. Course content		
Introduction to Fluid Mechanics, basic physical values. Continuum, vapour pressure. Fluid properties – density, surface tension, viscosity. Viscosity measurement. SAE oil classification. Fluid statics, Pascal's law. Pressure, Compressibility, Bulk Modulus of Elasticity, Speed of sound. Euler equation of fluid statics. Application of Pascal's law in hydraulic machinery. Euler equation of fluid statics. Relative fluid movement. Pressure measurement devices. Fluid forces on flat surfaces. Buoyancy and stability. Fluid kinematics, velocity and acceleration. Fluid dynamics. Conservation of Mass - The Continuity Equation, The Linear Momentum and Moment of Momentum Equations with the Bernoulli equation, The Energy Equation with the modified Bernoulli equation. Euler equation of motion. Application of the Bernoulli equation: orifices, weirs, Pitot tube, Venturi meter. Steady closed conduit flow. Cavitation. Reynolds number (Moody Chart) and other numbers important for Fluid Mechanics. Transition from laminar to turbulent flow. Turbulence – velocity profile, turbulence modelling. Minor and friction losses. Pipes systems – parallel pipes and pipes in series.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		

Course attendance, activity, homework, studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper		Experimental work	x
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio			x				
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, homework, continuous knowledge testing (two mid-term exams), written exam							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
L. Sopta, L. Kranjčević, Fluid mechanics, script. Tehnički fakultet Rijeka, 2004. (in Croatian)					network version		20
Bruce R. Munson, D. F. Young, T. H. Okiishi, Fundamentals of Fluid Mechanics, 4th Updated Edition, John Wiley and Sons, 2003.					1		20
Streeter, V.L, Wylie E.B., Fluid mechanics, 8th edition, McGraw Hill, 1985.					1		20
1.10. <i>Supplementary readings</i>							
Internal script.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name		Fundamentals of Electrical Engineering					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		compulsory					
Year		1.					
Number of credits and mode of delivery		ECTS student workload coefficient			5		
		Number of hours (L+P+S)			30+15+0		
Course description							
1.1. Course aims							
Understanding the relationship between electrical quantities. Measurements of basic electrical quantities. Knowledge of the basic principles of electrical machines.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Explain the basic physical phenomena, quantities and laws in the field of electricity and magnetism. Define and explain the terms, determine the quantitative relationship between the basic electric quantities of DC and AC circuits. Define and explain the terms, determine the quantitative relationship between the basic quantities of the magnetic circuits. Explain the basic principles of basic electrical devices and machines. Explain and apply basic measurement of electrical quantities and methods of measurement.							
1.4. Course content							
The structure of matter. Electric charge. Electric field, potential. Electrical capacity. Direct current. Circuits. Ohm's law and Kirchhoff's laws. DC energy and power. The magnetic field. Magnetic flux. Induction. A current in a magnetic field. Electromagnetic induction. Self-induction, mutual-induction. Magnetic properties of matter. The magnetization curve. The magnetic circuit. Alternating current. Frequency, phase relations, and the mean and effective values. AC circuit with R, L, C elements. Power and energy of alternating current. Symmetrical three-phase system. Transformer. Synchronous generator and asynchronous motor.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, activity, studying.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	X	Participation in class		Seminar paper		Experimental work	
Written exam	X	Oral exam	X	Essay		Research	

Project		Continuous assessment of knowledge	X	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Course attendance, continuous knowledge testing (tests, mid-term exams), written and oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Pinter, V.: Fundamentals of electrical engineering - part I, Tehnička knjiga, Zagreb, 1994. (in Croatian)					14		20
Pinter, V.: Fundamentals of electrical engineering – part II, Tehnička knjiga, Zagreb, 1994. (in Croatian)					10		20
Đurović, G.: Electrical engineering I, Školska knjiga, Zagreb, 2004. , (in Croatian)					11		20
Đurović, G.: Electrical engineering II, Školska knjiga, Zagreb, 2004. , (in Croatian)					10		20
1.10. <i>Supplementary readings</i>							
Šehović, E., Tkalić, M., Felja, I.: Fundamentals of electrical engineering - collection of examples (part 1), Tehnička knjiga, Zagreb, 1987. (in Croatian) Felja, I., Koračin, D.: A collection of assignments and solved examples from fundamentals of electrical engineering, part 1., Školska knjiga, Zagreb, 1991. (in Croatian)							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Fundamentals of Mechatronics	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. Course aims		
Acquisition of fundamental knowledge of the principles, components, and design of mechatronic systems. Understanding the interaction between mechanical, electrical, electronic, and computer-based components within a mechatronic system. Development of the ability to model, analyze, simulate, and integrate sensors, actuators, control units, and software solutions into a functional mechatronic system.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Explain and justify the concept of mechatronics and the mechatronic approach to designing engineering systems. Analyze the basic components of mechatronic systems and their interrelationships. Apply mechanical, electrical, and electromechanical models to model mechatronic systems. Analyze the static and dynamic behavior of mechatronic systems using mathematical models and simulation. Select and justify appropriate sensors, actuators, and control components for a given mechatronic system. Design and integrate basic components into a functional mechatronic system in accordance with specified requirements.		
1.4. Course content		
Modeling of mechatronic systems and their basic components. Block diagrams and simulation. Mechanical systems and translational and rotational energy transmission elements. Mechanical transducers, energy storage elements, and control elements. Electrical and electromechanical systems. Sensors, measurement systems, and measurement signal processing. Electrical, pneumatic, and hydraulic actuators. Pneumatic and hydraulic systems, functional plans and functional diagrams, electropneumatics and electrohydraulics. Control units in mechatronic systems and sensor-actuator interfacing. Basic principles of data acquisition, monitoring, and control of mechatronic systems. Fundamentals of open- and closed-loop control, static and dynamic system characteristics, and basic controllers. Static and dynamic behavior of mechatronic systems. Use of simulation and programming environments for data acquisition, measurement signal processing, interfacing with measurement and control hardware, and control of sensors and actuators.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☒ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		
Attendance, class participation, preparation and problem solving, independent learning.		

1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class	x	Seminar paper	x	Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							
Active participation in class, continuous assessment (partial exams), work on laboratory exercises and problem solving, written/oral exam.							
1.9. Required readings and number of copies relative to the number of students currently taking the course							
Title					Number of copies		Number of students
Lecture notes					Available on Merlin		
1.10. Supplementary readings							
R. H. Bishop: "Mechatronics: an introduction", CRC Press, 2017. R. H. Bishop: „The Mechatronics Handbook“ – 2nd ed., CRC Press, 2007. R. M. Schmidt, G. Schitter, A. Rankers, J van Eijk: „The Design of High Performance Mechatronics“ – 2nd ed., Delft University Press, 2014.							
1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name	German Language I						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient				3		
	Number of hours (L+P+S)				15+15+0		
Course description							
1.1. Course aims							
Students should be able to use general purpose German as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level).							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Students should be able to: compare general with technical German on the basis of selected texts and topics; recognize and explain grammatical structures and principles typical of the vocational jargon from examples; implement grammatical structures and aspects in speaking and writing activities; recognize key words and/or information in selected texts as well as differentiate and analyse relevant elements in them; describe and interpret accurately simple diagrams, charts, figures and mathematical formulae.							
1.4. Course content							
Topics: Engineering profession, Branches of engineering, Studying at the Faculty of Engineering, Mathematical expressions, formulae and symbols, Basics of mechanics, Energy and forms of energy, Renewable and unrennewable energy sources, Presentation skills, Writing skills. Grammatical and language structures: tenses, verbs, prepositions, modal verbs, nouns, compounds, word formation, passive voice, subordinate clauses.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Attendance, activity in class, independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	

Portfolio						
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>						
Attendance, seminar paper, continuous evaluation of knowledge (two tests), written exam.						
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>						
Title					Number of copies	Number of students
Velčić Janjetić, E.: Radni materijal za Njemački jezik I					available on Merlin	
1.10. <i>Supplementary readings</i>						
Steinmetz, M. & Dintera, H.: Deutsch für Ingenieure. Ein DaF-Lehrwerk für Studierende ingenieurwissenschaftlicher Fächer. Springer Fachmedien. Wiesbaden 2014.						
Fearn, A. & Buhlmann, R.: Technisches Deutsch für Ausbildung und Beruf. Lehr- und Arbeitsbuch. Goethe Institut - Verlag Europa-Lehrmittel. Haan-Gruiten 2013.						
Štambuk Z./Marinić, D.: Deutsch und Technik. Školska knjiga. Zagreb 1993.						
Jin, F. & Voß, U.: Grammatik aktiv A1-B1. Verstehen-Üben-Sprechen. Cornelsen Verlag. Berlin 2018.						
Buscha, A. & Szita, S.: B-Grammatik. Übungsgrammatik DaF. Sprachniveau B1-B2. Schubert Verlag. Leipzig 2015.						
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>						
Through the Institution`s Quality Assurance System.						

GENERAL INFORMATION							
Course name	German Language II						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient			3			
	Number of hours (L+P+S)			15+15+0			
Course description							
1.1. <i>Course aims</i>							
Students should be able to use professional jargon independently, namely communicate with other experts in the field of the engineering profession and in an international environment, at the B2 level of the Common European Framework of Reference for Languages.							
1.2. <i>Course enrolment requirements</i>							
None							
1.3. <i>Intended course learning outcomes</i>							
Students should be able to: recognize and explain grammatical structures typical of the vocational jargon; implement grammatical structures in writing activities; differentiate and analyse relevant elements in the text; paraphrase certain relevant parts in the text; write summaries of the text; analyse and describe more complex diagrams, charts, figures, processes and mathematical formulae; defend orally their own positions as well as critically evaluate solutions of given problems.							
1.4. <i>Course content</i>							
Topics: Materials in engineering, Material properties, Machine elements, Material processing. Mechanical and non-mechanical joints. Man and machines. Discoveries and inventions. The computer. The internet. Technology and its influence on society. Writing and speaking skills. Grammatical and language structures: relative clauses, adjectives and comparison of adjectives, participles, word formation. prefixes and suffixes of nouns and adjectives, general vs. professional language on the example of vocabulary, conditional clauses.							
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. <i>Student obligations</i>							
Attendance, activity in class, independent learning.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Attendance, seminar paper, continuous assessment of knowledge, written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies	Number of students	
Velčić Janjetić, E.: Radni materijal za Njemački jezik II					available on Merlin		
1.10. <i>Supplementary readings</i>							
Steinmetz, M. & Dintera, H.: Deutsch für Ingenieure. Ein DaF-Lehrwerk für Studierende ingenieurwissenschaftlicher Fächer. Springer Fachmedien. Wiesbaden 2014.							
Fearn, A. & Buhlmann, R.: Technisches Deutsch für Ausbildung und Beruf. Lehr- und Arbeitsbuch. Goethe Institut - Verlag Europa-Lehrmittel. Haan-Gruiten 2013.							
Štambuk Z./Marinić, D.: Deutsch und Technik. Školska knjiga. Zagreb 1993.							
Grujoski V./Kovačić D.: Tekstovi, vježbe i zadaci iz njemačkog jezika za elektrotehničku struku. Školska knjiga. Zagreb 1997.							
Jin, F. & Voß, U.: Grammatik aktiv A1-B1. Verstehen-Üben-Sprechen. Cornelsen Verlag. Berlin 2018.							
Buscha, A. & Szita, S.: B-Grammatik. Übungsgrammatik DaF. Sprachniveau B1-B2. Schubert Verlag. Leipzig 2015.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution`s Quality Assurance System.							

GENERAL INFORMATION		
Course name	Heat Engines and Devices I	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	2.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+15+0
Course description		
1.1. <i>Course aims</i>		
Acquiring general knowledge of the thermal volumetric machines and complex influences of certain functions on machine efficiency. Acquiring knowledge about complex subsystems of volumetric machines. Particularly insisting on the adoption of knowledge related to the conversion of fuel chemical energy into heat and continuing into mechanical work.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Application of the mechanics and the theory of vibration knowledge to the cranking mechanism. Analysis of the kinematics, dynamics, loads, and vibrations of the cranking mechanism. Application of the thermodynamics and fluid mechanics laws to processes in compressors. Analysis of processes in compressor and its equipment and its impact on the characteristics of the compressor. Application of the laws of thermodynamics and mechanics to the processes of internal combustion engines. Analysis of the processes in the internal combustion engine and its equipment and their impact on the characteristics of the engine as a whole.		
1.4. <i>Course content</i>		
Introduction to volumetric heat engines. Basic energy conversion processes. Thermodynamic processes. Characteristic parameters of volumetric machines. Auxiliary systems. Introduction to the reciprocating machines. Basic dimensions and parameters. Kinematics and dynamics of the cranking mechanism. Dynamics of multi-cylinder machines. Reciprocating compressors. Classification and application. The process of the compressor. Characteristics. Compressor capacity control. Parts of the system under pressure. Internal combustion engines. Ideal thermodynamic processes and efficiency. The real internal combustion engine process. Engine characteristics. Measuring the engine power and other parameters. Fuels and fuel-air mixtures. Exchange of the working fluid. Engine supercharging and turbocharging. Preparation of the fuel-air mixture. Combustion in the engine. Heat transfer in the engine. Emissions and environment protection. Measuring of emissions level. Regulations on allowable emissions. Engine control and protection systems. Engine design. Engine parts. Materials. Auxiliary systems.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Course attendance, activity, homework, studying.		

1.7. Monitoring student work (mark the appropriate boxes with an X)

Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. Assessment and evaluation of student work during classes and the final exam

Active participation in class, continuous knowledge testing (two mid-term exams), oral final exam.

1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
Jeras, D.: Piston Engines, Devices, Školska knjiga, Zagreb, 1992. (in Croatian)	5	5
Andrassy, M.: Reciprocating Compressors, Fakultet strojarstva i brodogradnje, Zagreb, 2004. (in Croatian)	1	5

1.10. Supplementary readings

Heywood, J. B.: Internal Combustion Engines Fundamentals, McGraw Hill Book Co., New York, 1988.
Ferrari, G.; Onorati, A.; D'Errico, G.: Internal combustion engines, Società Editrice Esculapio, 2022.
Gupta, H. N.: Fundamentals of internal combustion engines, PHI Learning Pvt. Ltd., 2025.

1.11. *Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.*

Through the Institution's quality assurance system.

GENERAL INFORMATION		
Course name	Heat Engines and Devices II	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+15+0
Course description		
1.1. Course aims		
Obtaining theoretical knowledge and skills about dynamic (turbo) heat engines and devices.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Description and analysis of the thermal process in steam turbines. Analysis of steam, heat, and fuel consumption in steam turbine plants. Description of the thermal process in the steam generator. Analysis of water and vapor circulation in steam generators. Analysis of the thermal process in turbine stage. Thermodynamic calculation of the turbine stage. Analysis of the flow losses in turbine stage and turbine as a whole. Description of the control and protection of the turbine. Description of the energy conversion process in a gas turbine. Description of the gas turbine structural components. Description of the turbine operation and exploitation. Description of the turbine maintenance and overhaul.		
1.4. Course content		
Development of heat dynamic (turbo) engines and their significance. Thermal power plant process. Thermal power plant efficiency. Steam, heat, and fuel consumption in thermal power plants. Steam generators and their design. Combustion and stoichiometric ratios. Sizing of heating surface. Circulation in the steam generator. Design of the steam generator. Control of the steam generator. Water for steam generators. Steam turbines and their applications. Thermal process in turbine stage. The losses in the turbine and turbine stage. Multistage steam turbines. The basic design of turbine structures. Control and protection of turbines. Operation and maintenance of the turbines. Gas-turbine plants. Open and closed gas-turbine process. The design and performance of gas-turbine parts. Turbocompressors. The combustion chambers. The gas turbine performance. Gas-turbine power plants' efficiency improvement.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		
Lectures and exercises attendance, individual learning and exercise solving.		
1.7. Monitoring student work (mark the appropriate boxes with an X)		

Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Activity in class, continuous knowledge testing (two mid-term exams), oral final exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Lecture notes					Available on Merlin		
1.10. <i>Supplementary readings</i>							
Prelec, Z. Marine Steam Generators, Školska knjiga, Zagreb, 1990. (in Croatian) Tanuma, T.: Advances in steam turbines for modern power plants, Woodhead Publishing, 2022. Gülen, S. C.: Gas and steam turbine power plants: Applications in sustainable power, Cambridge University Press, 2023.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Heating and Air Conditioning Systems	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	2.	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. <i>Course aims</i>		
The course aims to provide students with theoretical knowledge and develop the practical skills required for the design, application, and operation of building heating, ventilation, and air-conditioning systems.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Upon successful completion of the course, students will be able to: • Define and explain the factors affecting thermal comfort and the influence of climatic and meteorological data on building energy balances. • Analyze the influence of the thermal properties of building materials and building characteristics on energy consumption for heating, cooling, and domestic hot water preparation. • Describe the function, design, and construction of the basic components of heating systems, including heat emitters, piping, circulation pumps, expansion vessels, and isolation and safety valves and fittings. • Describe, differentiate, and compare natural and mechanical ventilation systems, partial and full air-conditioning systems, and explain methods of distributing conditioned air within indoor spaces. • Apply acquired knowledge to the calculation, sizing, and selection of basic components of heating, ventilation, and air-conditioning systems when solving practical problems. • Describe the basic elements and principles of automatic control and explain the role of central monitoring and control systems in HVAC systems.		
1.4. <i>Course content</i>		
Physiological foundations of thermal comfort. Thermal regulation of the human body. Thermal comfort indices. Indoor air quality. Meteorological and climatic fundamentals of heating, ventilation, and air conditioning. Meteorological and climatic factors and their influence on heating, ventilation, and air conditioning in buildings. Fundamentals of building physics. Thermal and energy characteristics of buildings. Thermal properties of building materials. Calculation of energy demand for building heating and cooling and domestic hot water preparation. Classification of heating systems. Heat sources for heating systems. Hot-water central heating systems. District heating. Basic components and equipment of heating systems. Fundamentals of heating system design, calculation, and selection of basic system components. Natural and mechanical ventilation. Air-conditioning systems. Indoor air distribution. Sources of heating and cooling energy for air-conditioning systems. Fundamentals of the design, calculation, and selection of basic components of mechanical ventilation and air-conditioning systems. Basic elements and principles of automatic control of HVAC systems. Central monitoring and control systems for HVAC systems.		

1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work		☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____			
1.6. <i>Student obligations</i>							
Course attendance, activity, homework, studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio			x				
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, homework, continuous knowledge testing (two mid-term exams), written and oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title				Number of copies		Number of students	
Materials from the lectures and exercises.				Available on the course website		10	
1.10. <i>Supplementary readings</i>							
ASHRAE: 2024 ASHRAE Handbook—HVAC Systems and Equipment. ASHRAE, Atlanta, 2024. Labudović, B.: Priručnik za grijanje. Energetika marketing (in Croatian), Zagreb, 2005. Labudović, B.: Priručnik za ventilaciju i klimatizaciju. Energetika marketing (in Croatian), Zagreb, 2015. ASCENT – Center for Technical Knowledge: Exploring Autodesk Revit 2025 for MEP, 11th Edition. ASCENT, 2024. Recknagel, H.; Sprenger, E.; Schramek, E.-R.: Recknagel – Taschenbuch für Heizung und Klimatechnik, 81. Ausgabe 2023/2024, ITM InnoTech Medien (in German), 2022.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name	Hydraulic Machines VO						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	3.						
Number of credits and mode of delivery	ECTS student workload coefficient			5			
	Number of hours (L+P+S)			30+15+0			
Course description							
1.1. Course aims							
An understanding of hydraulic machinery fundamentals and methods for selection of hydraulic machines in different work regimes. Understanding the limits of hydraulic machinery application, related to cavitation. Understanding the pump operating point. Understanding of the operation of a complex system composed of several turbomachines.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Define and describe hydraulic machines classification. Define and describe the Euler turbine equation and methods for selection of turbomachines. Define, describe and apply dimensional analysis, similarity laws for turbomachinery, model testing and sizing, selection, and performance of turbomachines. Apply acquired knowledge of turbomachines to water turbines (Kaplan, Francis and Pelton), pumps and fans. Define and describe the degree of reactivity, cavitation and NPSH for pumps. Define and analyze numerical fluid flow modelling in turbomachines: isolated profile analyses and planar flow through a cascade. Describe and analyze the operation of a system that consists of several turbomachines.							
1.4. Course content							
The definition and classification of turbomachines. The Euler turbine equation. Methods of selecting turbomachines. Dimensional analysis. The similarity theory. Model testing. Typical performance curves. Dimensionless quantities. Kaplan, Francis and Pelton turbines. Pumps. Fans. The operating point, system resistance curve and pump curve. The degree of reactivity. Cavitation. NPSH. Fluid flow modeling in turbomachines. The two-dimensional cascade theory.							
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____			
1.6. Student obligations							
Attendance, activity, homework, independent learning							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Course attendance, activity, homework, continuous testing of knowledge (two mid-term exams), final exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies	Number of students	
Čarija, Z., Hydraulic machines, Tehnički fakultet Rijeka, 2008.- (pdf web release) , (in Croatian)					pdf, web	20	
Pečornik, M., Hydraulic machines fundamentals, Tehnički fakultet Rijeka, 1977. (in Croatian)					1	20	
Horvat, D., Vodne turbine, Tehnička knjiga, 1955., (in Croatian)					1	20	
Krivchenko, G., Hydraulic Machines: Turbines and Pumps, ISBN 1-56670-001-9, CRC Press, 1994.					1	20	
1.10. <i>Supplementary readings</i>							
Rouse, H., Engineering Hydraulic, Iowa Institute of Hydraulic Research, 1950. Raabe, J., Hydraulische Maschinen und Anlagen I, II, III, VDI Verlag, 1970.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name		Hydraulics and Pneumatics					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		optional					
Year		3.					
Number of credits and mode of delivery		ECTS student workload coefficient			5		
		Number of hours (L+P+S)			45+15+0		
Course description							
1.1. Course aims							
Acquisition of the knowledge and skills required for the application, calculation, design and simulation of hydraulic and pneumatic systems using appropriate software and laboratory equipment.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Explain how power is transmitted in hydraulic and pneumatic systems. Define the sources of hydraulic energy and compressed air energy. Distinguish between control components in hydraulic and pneumatic systems. Describe auxiliary devices in hydraulic and pneumatic systems. Define logic circuits and types of control. Connect hydraulic and pneumatic components to form simple systems. Apply the acquired knowledge to complex hydraulic and pneumatic systems.							
1.4. Course content							
Operating principles, advantages, disadvantages and applications of hydraulic systems. Physical and performance properties of hydraulic oils. Hydraulic pumps, motors and cylinders. Hydraulic valves: directional control, pressure control, flow control and shut-off valves. Pipes and pipe fittings. Auxiliary hydraulic devices. Sealing in hydraulic and pneumatic systems. Calculations for hydraulic components and systems. Operating principles, advantages, disadvantages and applications of pneumatic systems. Compressed air generation and preparation. Pneumatic valves and actuators. Design and computer simulation of simple hydraulic and pneumatic systems. Assembly of simple pneumatic systems using a laboratory training system.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☐ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Class attendance, active participation in class, completion of laboratory exercises, independent study.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	x
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active participation in class, completion of individual assignments and laboratory exercises, continuous assessment (two midterm exams), final written examination.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Siminiati, D.: Uljna hidraulika, Tehnički fakultet, Sveučilište u Rijeci, Rijeka, 2012. (in Croatian)					13		10
Gregov, G.: Pneumatsko upravljanje, skripta za vježbe, Tehnički fakultet, Sveučilište u Rijeci, Rijeka, 2023. (in Croatian)					Available online		10
1.10. <i>Supplementary readings</i>							
Nikolić. J.: Pneumatsko upravljanje, Zagreb, 1990. (in Croatian)							
Beater, P.: Pneumatic drives: System Design, Modelling and Control, Springer, 2006.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

Course name	Machine Elements I						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient				6		
	Number of hours (L+P+S)				45+15+0		
Course description							
1.1. <i>Course aims</i>							
To develop the ability to calculate and apply basic machine elements while considering load and stress types and the function and material of the machine element.							
1.2. <i>Course enrolment requirements</i>							
None.							
1.3. <i>Intended course learning outcomes</i>							
Distinguish the types of stresses of machine elements. Distinguish removable and non-removable joint. Compare removable and non-removable clamp connections. Distinguish pins, bolts and keyed connections. Compare the types of springs. Compare the axle and the shaft. Define and select machine elements using norms. To implement the acquired knowledge to concrete examples.							
1.4. <i>Course content</i>							
Load capacity of machine elements. Fatigue. Wöhler's diagram. Smith's charts. Stress concentration. Complex and equivalent stresses. Allowable stresses and safety factors in the calculation of machine elements. Basic pipeline elements. Welded, soldered, adhesive and riveted joints. Pressure vessels. Fixing bolts. Preloaded bolts. Surface quality, tolerances and fits. Interference fits and clamped joints. Tapered joints. Clamping ring and collet connections. Bolts, pins and keyed connections. Springs. Torsion, disk and leaf springs. Axles and shafts. The stability of long axles and shafts.							
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. <i>Student obligations</i>							
Course attendance, class participation, solving structural tasks in class and at home, independent studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project	x	Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>		
Active class participation, continuous knowledge testing (three mid-term exams), written and oral exam.		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
Križan, B.: Osnove proračuna i oblikovanja konstrukcijskih elemenata, Školska knjiga, Zagreb, 2008. (in Croatian)	4	30
Decker, K.H.: Elementi strojeva, Golden marketing-Tehnička knjiga, Zagreb, 2006. (in Croatian)	3	30
Krautov strojarski priručnik, Sajema, Zagreb, 2009. (in Croatian)	6	30
1.10. <i>Supplementary readings</i>		
Orlić, Ž., Orlić, G.: Osovine i vratila, Zigo, Rijeka, 2004. (in Croatian) Orlić, Ž., Orlić, G.: Metalne opruge, Zigo, Rijeka, 2004. (in Croatian) Križan, B.; Franulović, M., Zelenika, S.: Konstrukcijski elementi - Zbirka zadataka: Osnove, elementi za spajanje, osovine i vratila, Tehnički fakultet Sveučilišta u Rijeci, Rijeka, 2012. (in Croatian)		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION							
Course name	Machine Elements II						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient				6		
	Number of hours (L+P+S)				45+15+0		
Course description							
1.1. Course aims							
Development of the ability of calculation and application of machine elements and assemblies.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Evaluation and selection of standardized machine elements and assemblies. Assortment of the criteria for dimensioning and design of power transmissions, couplings and associated elements and assemblies. Application of standardized calculation procedures to solve the tasks of appointed problem. Based on the imposed requirements and selected criteria, calculation and design of a machine assembly in accordance with the standards.							
1.4. Course content							
Gear drives. Couplings. Belt and chain drives. Purpose, forms, selection of elements and assemblies. Basic geometry and load capacity of structural assemblies. Design project.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, activity, homework, studying.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project	x	Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							

Active participation in class. Written or oral examination through two mid-term exams. Continuous evaluation of accuracy, precision, completeness and creativity in solving the problem assignment. Written verification of acquired knowledge on the final exam.		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
Decker, K.H.: Machine Elements, Golden marketing-Tehnička knjiga, Zagreb, 2006. (In Croatian)	3	7
1.10. <i>Supplementary readings</i>		
Kraut's Mechanical Engineering Handbook, Sajema, Zagreb, 2009. (in Croatian) Obsieger, B., Sliding Bearings, Zigo, Rijeka, 2003. (In Croatian)		
Obsieger, B., Couplings, Zigo, Rijeka, 2004. (In Croatian)		
Obsieger, B., Gear Transmissions, Zigo, Rijeka, 2003. (In Croatian)		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION							
Course name	Machine Tools						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient				5		
	Number of hours (L+P+S)				30+15+0		
Course description							
1.1. Course aims							
Introduction to the basic concepts and characteristics of machine tools. Ability to solve problems related to CNC machine tools programming.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Define and classified machine tools. Analyse control systems on machine tools. Make machine tool simulation for real example. Describe characteristics of machining centers, special machining tools. Describe clamping systems, storage, tools and workpiece transportation. Introduction of modern trends in machine tools building.							
1.4. Course content							
Basic terms, classification of machine tools. Review and characteristics of basic structural elements of machine tools. Static and dynamic stiffness of machine tools. Tribology of machine tools. Main and feed drives. Clamping systems, storage, tools and workpiece transportation. Electronic systems on machine tools. Review and development of control systems on machine tools (NC/CN/DNC/AC). Basic classification and terms of modern CNC lathes. Basic classification and terms of modern CNC milling machine. Machining centers, special machining tools. Machine tools for high speed machining. Basic programming of NC machine tools. G-code, syntax, technological and geometrical information. Example of NC program. CAD/CAM programming. Automatic systems of workpiece transport (AGV).							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☒ field work			☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, student activity on course, homework and independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	×	Participation in class	×	Seminar paper		Experimental work	
Written exam	×	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	×	Student report		Practical work	

Portfolio		Homework	×			
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>						
Active class participation, homework, sustained knowledge check and written exam.						
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>						
Title				Number of copies		Number of students
Hriešik, A.: Jurković, Z.: Production Equipment – Vol. 1, Tehnički fakultet Rijeka, 2003. (in Croatian)				10		10
Cebalo, R.: Machine Tools, Zagreb, 2000. (in Croatian)				1		10
Cebalo, R.: Machining Systems – Flexible Machining Systems, Zagreb, 2000. (in Croatian)				1		10
Marek, J., et al.: Design of CNC Machine Tools, ISBN 978-80-260-8637-6, MM publishing, 2015.				2		10
1.10. <i>Supplementary readings</i>						
Kief, Hans B., Schwarz, K., Roschiwal, Helmut A.: The CNC Handbook, Industrial Press, 2022. Weck, M.: Werkzeugmaschinen Fertigungssysteme, Band 1-5, Springer-Verlag, 1998-2002. Smid, P.: CNC programming handbook, ISBN-13: 978-0831133474, Industrial Press, 2008. Pahole, I., Balič, J.: Machine Tools, Maribor, 2003. (in Slovenian)						
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>						
Through the Institution's quality assurance system.						

GENERAL INFORMATION		
Course name	Manufacturing Systems	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+30+0
Course description		
1.1. Course aims		
Enable students to analyse and design manufacturing systems based on the production programme, available resources, required capacities and material-flow requirements. To develop the ability to analyse different manufacturing system configurations and structures, the organisation of material flow and transport, and methods for grouping workpieces. The course introduces contemporary methods and tools for the design, analysis, evaluation and improvement of manufacturing systems.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Upon successful completion of the course, the student will be able to: Define a manufacturing system. Describe the characteristics of the production programme. Explain the availability of equipment and workforce for manufacturing. Analyse the technical and economic utilisation of manufacturing capacity and the manufacturing system. Define the correlation coefficient of operations and equipment. Explain workpiece handling and transport, including inbound, inter-operation and outbound transport. Define the workpiece processing cycle and explain processing, transport and waiting times. Explain different manufacturing system models, including single-product and multi-product, line, batch and flexible manufacturing systems. Explain the organisation of workpiece flow through a manufacturing system. Explain methods for grouping workpieces. Describe facility layout, equipment arrangement and warehouse organisation. Develop a manufacturing system design project including task definition, analysis of variables, development of the design concept, process plans, optimisation of alternatives and selection of an appropriate manufacturing system model. Select an appropriate transport system.		
1.4. Course content		
Manufacturing systems: definition, objectives, structure and basic components. Production programme and its characteristics: product types, production quantities and product mix. Influence of product volume and variety on manufacturing system configuration. Availability of equipment and workforce. Manufacturing capacity and technical and economic capacity utilisation. Basic manufacturing system performance measures: cycle time, takt time, throughput, work in process and bottlenecks. Material-flow models and analysis. Continuous, intermittent, linear and flexible flow patterns. Process-routing diagrams and operation sequences. One-way and two-way flows. Operation–equipment correlation coefficient. Basic graphical methods for representing and analysing material flows. Workpiece handling and transport. Inbound, inter-operation and outbound transport. Levels of transport automation. Conventional material-handling systems and contemporary automated internal transport systems. Basic principles of AGV and AMR applications. Organisation of warehouses and intermediate storage.		

Workpiece processing cycle: processing, transport and waiting times and other components of production lead time. Influence of flow organisation on manufacturing cycle.

Manufacturing system models: single-product and multi-product systems, job and batch production, production lines, cellular manufacturing systems and flexible manufacturing systems. Organisation of workpiece flow through the manufacturing system. Methods for grouping workpieces and fundamentals of group technology.

Production facility layout. Basic types of equipment arrangement. Layout analysis and design. Integration of equipment layout, material flow, transport and storage.

Manufacturing system design process: definition of the design task, analysis of input data and variables, development of alternative concepts, planning of processes and flows, capacity sizing, evaluation and optimisation of design alternatives, and selection of an appropriate manufacturing system and transport system.

Application of digital tools for creating, visualising and analysing manufacturing system models. Fundamentals of discrete-event simulation as a tool for analysing and comparing manufacturing system design alternatives.

1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
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1.6. *Student obligations*

Completion of practical assignments and development of a production system design project using appropriate methods and tools. Independent study and completion of the final written examination.

1.7. *Monitoring student work (mark the appropriate boxes with an X)*

Class attendance		Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project	x	Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. *Assessment and evaluation of student work during classes and the final exam*

Student performance is assessed through practical assignments and a production system design project in which the student analyses a given production programme, material flow, required capacity and resource organisation and develops and justifies an appropriate design solution. The final written examination assesses understanding of fundamental concepts and the ability to apply them to engineering problems.

1.9. *Required readings and number of copies relative to the number of students currently taking the course*

Title	Number of copies	Number of students
Mikac, T.: Projektiranje proizvodnih sustava, internal lecture notes	Available on Merlin	

1.10. *Supplementary readings*

Garcia-Diaz, A.; MacGregor Smith, J.: „Facilities Planning and Design“, Springer, 2024.

1.11. *Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.*

Through the Institution's quality assurance system.

GENERAL INFORMATION							
Course name	Manufacturing Technology I						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	1.						
Number of credits and mode of delivery	ECTS student workload coefficient				5		
	Number of hours (L+P+S)				30+15+0		
Course description							
1.1. Course aims							
Acquiring knowledge in casting processes and procedures for the production of castings. Understanding the process of solidification in the mold. Acquiring knowledge of the principles of casting design. Acquiring skills in designing of gating and risering system.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Explain and differentiate casting processes in the production of castings. Describe the process of alloy solidification in the mold. Define the gating and risering system. Describe the basic rules of casting design. Choose an appropriate casting process based on construction and technological requirements. Describe the testing methods of casting properties. Describe the methods of environmental protection in foundry production.							
1.4. Course content							
Casting processes and procedures in casting production. Casting materials. The solidification of metals and alloys in the mold. The gating and risering system. The rules of casting design. Features of casting alloys. Criteria for selection of casting process. Environmental protection in foundry production.							
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____			
1.6. Student obligations							
Course attendance, participation in teaching, homework preparation, studying.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio			x				

1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>		
Active class participation, homework, continuous knowledge testing (two mid-term exams), written and/or oral exam.		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
Katavić, I.: Foundry, Sveučilište u Rijeci, 1993. (in Croatian)	12	62
Lyman, T.: Metals Handbook, Melting and Casting, American Society for Metals	1	62
1.10. <i>Supplementary readings</i>		
Pelhan, C.: Casting, Ljubljana 1983. (in Slovenian) Casting Handbook, Savez ljevača Hrvatske. (in Croatian)		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION							
Course name	Manufacturing Technology II						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient			6			
	Number of hours (L+P+S)			45+15+0			
Course description							
1.1. Course aims							
Introduction to the basics of analysed production technologies/processes and their application, and training to select the most appropriate production process regarding economic aspects and the quality of the finished product, to perform calculations and to specify the technological parameters.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
To identify and to describe the basic metal forming processes and their application. To interpret the physical principles of metal forming and to explain the fundamental concepts. To select the most appropriate metal forming process for manufacturing a given product. To apply basic calculations for deformation force and deformation work, and to construct hardening curves of I., II. and III. degree. To identify and to describe the basic machining processes and their application. To interpret the physical principles of cutting theory. To describe tool geometry and to identify tool geometry and its application based on the manufacturer catalogue data. To calculate and to specify optimal cutting speeds, feeds and depths of cut based on standard calculations or manufacturer catalogue data.							
1.4. Course content							
Introduction and overview of manufacturing. Introduction to metal forming technology. Classification of processes. Physical principles. Basic concepts: plasticity and ductility, degrees of deformation, strain rate, flow stress. Basic concepts: deformation force and work, yield criterion, deformability and friction. Bulk forming, processes and machine tools. Sheet metal forming, processes and machine tools. Special and nonconventional metal forming processes. Introduction to machining technology. Classification of processes. Fundamentals of cutting processes. Cutting theory. Economic aspects of machining. Conventional machining processes. Nonconventional machining processes. Modelling, simulation, and optimization of cutting processes.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☒ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☒ multimedia and network ☒ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, control tasks, project task solving, independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	X	Participation in class		Seminar paper		Experimental work	

Written exam	X	Oral exam		Essay		Research	
Project	X	Continuous assessment of knowledge	X	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Course attendance, continuous assessment of knowledge, project task, written and/or oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Duplančić, I.: Obrada deformiranjem, FESB, Split, 2007 (in Croatian)					2		20
Cukor, G.: Proračuni u obradi metala rezanjem, interna skripta, Tehnički fakultet Sveučilišta u Rijeci, 2026 (in Croatian)					20		20
Cukor, G.: Nekonvencionalni, aditivni i hibridni proizvodni postupci, interna skripta, Tehnički fakultet Sveučilišta u Rijeci, 2026 (in Croatian)					20		20
1.10. <i>Supplementary readings</i>							
Kalpakjian, S., Schmid, S. R.: Manufacturing Processes for Engineering Materials, 5th ed., Pearson, 2014							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Materials	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	1.	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	30+30+0
Course description		
1.1. <i>Course aims</i>		
To introduce students to the fundamentals of materials science and enable them to understand the relationship between the structure, properties, and applications of materials, as well as to select appropriate materials for engineering applications. To acquire fundamental knowledge of materials testing methods, heat treatment processes, and the fundamentals of surface engineering.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
1. Analyze the relationship between the microstructure and properties of materials. 2. Analyze and compare basic materials testing methods. 3. Interpret and apply alloy phase diagrams. 4. Explain and distinguish between equilibrium and non-equilibrium transformations in steels. 5. Explain and select appropriate heat treatment processes for steels.		
1.4. <i>Course content</i>		
Definition and classification of engineering materials. Trends in the development and application of materials in engineering. Structure and properties of materials. Crystal imperfections. Solidification of metals. Diffusion. Alloy phase diagrams and their applications. Metallographic analysis of microstructure. Structure, properties, and applications of polymeric materials. Structure, properties, and applications of ceramic materials. Structure, properties, and applications of composite materials. Mechanical properties of materials. Basic destructive and non-destructive materials testing methods. Comparison and application of materials testing methods. Fe-Fe ₃ C phase diagram. Equilibrium and non-equilibrium transformations in steels. TTT diagrams and their applications. Basic heat treatment processes for steels and fundamentals of surface engineering. Selection of appropriate processes with respect to the required properties and applications.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☐ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Course attendance, participation in class, independent study.		
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>		

Class attendance	X	Participation in class	X	Seminar paper		Experimental work	
Written exam	X	Oral exam	X	Essay		Research	
Project		Continuous assessment of knowledge	X	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Continuous assessment (two midterm exams), written and/or oral examination .							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies	Number of students	
Smokvina Hanza, S., E-learning materials for lectures: Materials, RITEH, Rijeka, 2026. (in Croatian)					available on Merlin		
1.10. <i>Supplementary readings</i>							
Katavić, I., Uvod u materijale, RITEH, Rijeka, 2008. Filetin, T., Kovačiček, F., Indolf, J., Svojstva i primjena materijala, FSB, Zagreb, 2011. Smoljan, B., Toplinska obrada čelika, sivog i nodularnog lijeva, Zagreb: Hrvatsko društvo za toplinsku obradbu i inženjerstvo površina, Udžbenici Sveučilišta u Rijeci, 1999. Askeland, D. R., Wright, W. J., The science and engineering of materials, Boston: Cengage Learning, 2016.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name		Mathematics I					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		compulsory					
Year		1.					
Number of credits and mode of delivery		ECTS student workload coefficient			7		
		Number of hours (L+P+S)			30+45+0		
Course description							
1.1. Course aims							
The aim of the course is to provide students with fundamental knowledge of linear algebra and differential calculus and to develop their ability to apply matrices, determinants, vectors, functions, and derivatives in the analysis and solution of mathematical problems, including approximation and optimization problems.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Perform basic mathematical operations with matrices and determinants. Describe methods for solving systems of linear equations, solve such systems and discuss the resulting solutions. Perform vector operations and correctly calculate the sum of vectors, scalar and vector product in specific examples. Correctly interpret the fundamental concepts associated with functions of one variable (domain, parity, periodicity, the limit value, continuity). Identify, graph, and correctly interpret elementary functions. Define the derivative of functions of one variable and calculate the derivatives of elementary and selected composite functions. Apply derivatives to optimization problems, the analysis of functions and draw their graphs.							
1.4. Course content							
Matrices. Determinants. Solving systems of linear equations. Vector in the plane and in the space. The functions of one variable. Limits and continuity of functions. Elementary functions (properties and graphs). The definition of derivation and their properties. Derivatives of elementary and complex functions. Taylor's theorem. Application of derivatives (linear approximation, the determination of extremes, flow testing functions, optimization).							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☒ remote learning ☐ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, studying, activity, homework, control tasks and tests.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, continuous knowledge testing, written and oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies	Number of students	
Štambuk, Lj.: Mathematics I, Tehnički fakultet Sveučilišta u Rijeci, Rijeka, 2002. (in Croatian)					14	20	
Jurasić, K.-Dražić, I.: Mathematics I, Workbook, Tehnički fakultet Sveučilišta u Rijeci, Rijeka, 2008. (in Croatian)					5	20	
Demidovič, B. P.: Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, sva izdanja, (in Croatian)					6	20	
1.10. <i>Supplementary readings</i>							
Slapničar I.: Mathematics 1, Sveučilište u Splitu FESB, Split 2002, online textbook Finney, R. L., Thomas, G. B.: Calculus, Addison-Wesley Publishing Company, New York, 1992.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name	Mathematics II						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	1.						
Number of credits and mode of delivery	ECTS student workload coefficient			7			
	Number of hours (L+P+S)			30+45+0			
Course description							
1.1. Course aims							
Acquisition of fundamental knowledge of integral calculus, ordinary differential equations, Laplace transforms, and Taylor and Fourier approximations of functions. Development of the ability to apply analytical and numerical methods to solving mathematical problems.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Explain and correctly interpret the fundamental concepts of integral calculus for functions of one variable, as well as the properties of indefinite and definite integrals. Calculate indefinite and definite integrals using appropriate methods. Apply numerical methods to the approximate calculation of definite integrals. Apply definite integrals to calculate the areas of plane figures, arc lengths, volumes of solids of revolution, and surface areas of surfaces of revolution. Explain and correctly interpret the fundamental concepts of first- and second-order ordinary differential equations. Determine the general and particular solutions of selected first-order ordinary differential equations and second-order linear ordinary differential equations. Apply the basic properties of Laplace transforms to calculate the Laplace transforms of functions and solve differential equations. Explain the principles of selected numerical methods for solving first-order differential equations and apply them correctly. Approximate functions using Taylor and Fourier polynomials in selected examples.							
1.4. Course content							
Indefinite integrals. Definite integrals and their applications. Numerical methods for calculating definite integrals. First-order ordinary differential equations. Second-order linear ordinary differential equations. Laplace transforms. Application of Laplace transforms to solving differential equations. Numerical methods for solving first-order differential equations. Approximation of functions using Taylor and Fourier polynomials.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☒ remote learning ☐ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, activity, studying, control tasks and tests.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	

Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, continuous knowledge testing, written and oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Slapničar I.: Mathematics 2, Sveučilište u Splitu FESB, Split 2002, online book (in Croatian)					Free available online		20
Štefan Trubić M., Sopta L., Črnjarić-Žić N., Maćešić S.: Mathematics, a collection of tasks: integrals, ordinary differential equations, functions of several variables, Rijeka 2012, (in Croatian)					15		20
Demidovič, B. P. : Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, (in Croatian)					6		20
Kreyszig, E.: Advanced Engineering Mathematics, John Wiley&Sons, Inc. 2011.					4		20
1.10. <i>Supplementary readings</i>							
Slapničar, I.: Mathematics I, University of Split FESB, Split 2002, online textbook Finney, R. L., Thomas, G. B.: Calculus, Addison-Wesley Publishing Company, New York, 2014.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Measurement Technique VO	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+15+0
Course description		
1.1. <i>Course aims</i>		
Introducing the fundamentals of measurement and quality control. Acquiring specific skills in metrology and inspection methods and techniques. Familiarising students with current trends in the development of measurement in production and science.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Interpret basic metrological concepts. Perform measurements of selected geometric, mechanical and physical quantities using comparator, inspection, optical and sensor-based methods. Classify measurement errors and evaluate the measurement uncertainty of measurement results. A Process and validate measurement results using computer-aided tools for the acquisition and analysis of measurement data. Explain the basic principles of measurement using optical and 3D measuring systems. Perform calibration, testing and verification procedures for measuring instruments in accordance with standardization requirements.		
1.4. <i>Course content</i>		
Development and application of measurement. The SI system of units. Base, derived, non-SI accepted and Anglo-Saxon units of measurement. Fundamentals of metrology, rules of measurement, measurement errors and measurement uncertainty. Measurement and measuring instruments for: length, form, position, displacement, pressure, temperature, force, hardness, roughness, flow rate, rotational speed, sound and basic electromagnetic quantities. Sensors in process/product monitoring. Optical and optoelectronic measuring instruments. 3D contact and non-contact coordinate measuring machines and devices. Laser measurements. Calibration, testing and verification of measuring instruments. Management of measurement and inspection equipment. Documentation. Planning and documentation of measurements. Evaluation of measurement results.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Class attendance, in-class participation, participation in laboratory exercises, and independent study.		

1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge		Student report	x	Practical work	
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							
Laboratory exercises, continuous assessment and a written final exam.							
1.9. Required readings and number of copies relative to the number of students currently taking the course							
Title					Number of copies		Number of students
Lecture notes					Available on Merlin		
1.10. Supplementary readings							
Zaimović Uzunović, N.: Mjerna tehnika, Mašinski fakultet u Zenici, Zenica, 2006. (in Croatian) Jay L. Bucher: The Metrology Handbook, ASQ Quality Press, 2004. Graham T. Smith: Industrial Metrology, Springer, 2002. Bašić, H.: Mjerenja u mašinstvu, Mašinski fakultet, Sarajevo, 2008. (in Croatian)							
1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name		Mechanics I					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		compulsory					
Year		1.					
Number of credits and mode of delivery		ECTS student workload coefficient			7		
		Number of hours (L+P+S)			45+30+0		
Course description							
1.1. <i>Course aims</i>							
Obtaining theoretical knowledge and develop skills to solve practical problems in the field of statics.							
1.2. <i>Course enrolment requirements</i>							
None.							
1.3. <i>Intended course learning outcomes</i>							
Define force, moment for a point and an axis, couple of forces and resultant of a force system. Draw free body diagram for a planar and a spatial system of forces. Determine equilibrium equations and reaction forces. Analyse equilibrium problems that involve friction on the slope, screw, wedge and bearing, friction on belts and brakes and rolling friction. Define bending moment, shear force and axial force. Determine distribution of internal forces in trusses, beams and frames. Determine location of centroids of lines, areas and bodies.							
1.4. <i>Course content</i>							
Introduction. Terms and axioms of statics. Reactions. Planar systems of forces. Collinear, concurrent, parallel and general systems of forces. Moment of a force about a point. Determination of resultant of forces and equilibrium conditions for all systems of forces. Resolution of force into two and three components. Spatial systems of forces. Concurrent, parallel and general systems of forces. Moment of a force about a given axis. Centroids. Lines, areas and volumes. Pappus-Guldin theorems. Types of equilibrium. Trusses, beams and frames. Friction. Sliding: slope, screws, wedges, brakes, belt systems, bearings. Rolling friction.							
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. <i>Student obligations</i>							
Course attendance, activity, homework, studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio			x				
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, homework, continuous knowledge testing (three mid-term exams), written and oral exam							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Brnić, J.: "Statics", Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 2004. (in Croatian)					12		20
Brnić, J.: "Mechanics and structural elements", Školska knjiga, Zagreb, 1996. (in Croatian)					14		20
1.10. <i>Supplementary readings</i>							
Matejiček, F., Semenski, D., Vnučec, Z.: "Introduction to Statics", Golden Marketing, Zagreb, 1999. (in Croatian) Beer, F. P., Johnston, E.R., Eisenberg, E.R.: "Vector Mechanics for Engineers: Statics", McGraw-Hill, 2003. Das, M. B., Kasimali, A., Sami, S.: "Engineering Mechanics, Statics", Irwin, Boston, 1994.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Mechanics II	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	1.	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	30+30+0
Course description		
1.1. <i>Course aims</i>		
Obtaining theoretical and practical knowledge to solve problems in the field of kinematic of particle and rigid body. Ability to analyze basic motion characteristics like trajectory, displacement, velocity and acceleration. Development of theoretical and practical knowledge in the field of dynamics of a particle, systems of particles and rigid body.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Define motion of a particle in various coordinate system. Determine the equation of a trajectory on the basis of the equations of motion for the case of planar motion of particles. Analyze the translational and rotational motion about a fixed axis of a rigid body. Calculate the gear ratio for a given configuration of power transmissions. Define and explain Newton's laws and the concept of inertial forces. For a given instances of motion of particles one should apply; Principle of linear impulse and momentum and the law of conservation of mechanical energy. Identify the work and the power due to the force or torque on the particle. Define the axial moments of inertia of simple bodies. Apply parallel-axis theorem. Analyze the planar motion of a rigid body by the action of forces and moments. Analyze the free and forced vibration of single degree of freedom.		
1.4. <i>Course content</i>		
Kinematics of particles. Coordinate systems. Graphs of motion. Rectilinear motion. Velocity and acceleration. Constant velocity and constant acceleration motion. Harmonic oscillations. Curvilinear motion of particles. Position, velocity and acceleration of a particle in different coordinate systems. Motion along circular path. Relative motion. Kinematics of a rigid body: translational, rotational and planar motion. Determination of velocities. Velocity diagram method. Determination of accelerations. Acceleration diagram method. Polodes. Composition of rigid-body motions. Dynamics of a particle. Newton's laws. Inertial force. D'Alembert's principle. Linear momentum. Work of a force. Angular momentum. Potential and Kinetic energy. Power and efficiency. Dynamics of a rigid body. Translation. Rotation about fixed axis. Moments of inertia. Planar motion.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☐ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Course attendance, course participation, preparation of a seminar paper, independent study.		
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>		

[illegible]

GENERAL INFORMATION							
Course name		Organization and Economics					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		compulsory					
Year		2.					
Number of credits and mode of delivery		ECTS student workload coefficient			4		
		Number of hours (L+P+S)			30+15+0		
Course description							
1.1. Course aims							
To enable students to understand business systems, work organization, business decision-making, and entrepreneurial activity from the perspective of future engineers.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Explain business systems and the role of engineers within them. Distinguish basic organizational structures, functions, and business relationships. Analyze basic business and production processes. Explain the relationship between work, competencies, motivation, performance evaluation, and rewards. Recognize the role of communication, teamwork, leadership, and organizational culture. Prepare a basic proposal for improving business operations, work organization, or a business process.							
1.4. Course content							
Business systems and the role of engineers within business systems. Markets, products, services, customers, competition, and value creation. Organizational structures, business functions, business relationships, responsibilities, and work coordination. Business and production processes, and flows of work, information, materials, and decisions. Engineering job positions, competencies, career development, performance evaluation, motivation, and reward systems. Work economics, work processes, productivity, costs, and basic business performance indicators. Communication, teamwork, leadership, conflicts, and organizational culture in technical organizations. Digital tools, data, and artificial intelligence in work organization and business decision-making. Company founding, business models, recognition of business potential, and proposals for business system improvement.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Attendance, class participation, independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	

Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, continuous assessment, written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Žic, S.: Teaching Materials for the Course Organization and Economics, RITEH, Rijeka, 2026. (Merlin) (in Croatian)					available on Merlin		20
Mikac, T., Ikonić M.: Organizacija poslovnih sustava, Tehnički fakultet Sveučilišta u Rijeci, online skripta, Rijeka, 2011. (Merlin) (in Croatian)					available on Merlin		20
1.10. <i>Supplementary readings</i>							
Novak, M., Sikavica, P.: Business Organization, Informator, Zagreb, 1999. (in Croatian)							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Process Equipment and Devices	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. Course aims		
Assuming theoretical knowledge and development of skills for practical solving of problems in design and application of process equipment and devices.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Describe the classification and fields of application of tanks and pressure vessels, and perform design calculations for tanks and pressure vessels used in process plants. Describe the designs, construction characteristics and applications of heat exchangers and cooling towers in the process industry. Describe different designs and applications of process furnaces and interpret their heat balance calculations. Describe the designs of process columns, separators, filters and reactors. Calculate and size pipelines, select and calculate pipeline supports and thermal expansion compensators, and describe the selection and application of materials used in pipeline construction. Describe the types and applications of piping valves and fittings, interpret the relevant calculations, and select safety devices used in the process industry. Describe the characteristics of thermal insulation, select an appropriate type, and calculate the required thermal insulation for pipelines, tanks and process equipment. Describe the application of fans, compressors, pumps and vacuum devices in the process industry. Describe the application of control devices for pressure, flow, level and temperature. Describe the methodology for the maintenance of process equipment.		
1.4. Course content		
Introduction to process equipment and devices. Types, sizing and protection of tanks. Classification of pressure vessels. Designs, construction characteristics and applications of heat exchangers and cooling towers. Designs, applications and heat balance calculations of process furnaces. Chimney calculations. Applications and designs of process columns, separators, filters and reactors. Fundamentals of pipeline calculation and sizing, pipeline supports and thermal expansion compensators, and selection of pipeline materials. Piping valves and fittings. Types, design and specifications of safety devices. Characteristics and selection of thermal insulation, calculation of insulation thickness, and installation of thermal insulation. Applications of fans, compressors, pumps and vacuum devices in the process industry. Control devices for pressure, flow, level and temperature. Maintenance of process equipment and devices.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		

Course attendance, activity, home work - seminar paper presentation, studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam		Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active participation in class, seminar paper, continuous knowledge testing (two mid-term exams), written and oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Pavković, B.: Process equipment and devices – lecture notes, University of Rijeka, 2014. (in Croatian)					Available on Merlin		4
Beer, E.: Priručnik za dimenzioniranje uređaja kemijske i procesne industrije, SKTH-Zagreb, 1985.					1		4
1.10. <i>Supplementary readings</i>							
Cheremisnof, N. P.: Handbook of Chemical Processing Equipment, (book), Butterworth & Heinemann, Boston, Oxford 2000. Bloch, H. P.: Major Process Equipment Maintenance and Repair, (book), Gulf Publishing, Houston 1996. Širola, D.: Machinery, Equipment and Devices in Oil and Petrochemical Industry, (book), Školska knjiga Zagreb, 1986. (in Croatian).							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Production Organization and Management	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	4
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. <i>Course aims</i>		
To enable students to understand the organisation of production as a business function and to analyse the basic processes of manufacturing preparation, production planning and operational production control. To develop the ability to apply basic methods of manufacturing cost calculation and inventory management and to understand the organisation of production operations and supporting functions. The course introduces contemporary approaches to the organisation, digital support and monitoring of production processes, integrating manufacturing process planning, production planning and control, tooling management, quality control and maintenance.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Upon successful completion of the course, the student will be able to: Define the role and tasks of the production function within a business system. Describe the factors influencing the organisation of the production function. Define the tasks and main groups of activities involved in manufacturing process planning. Explain the organisation of manufacturing process planning. Prepare basic manufacturing process planning documentation. Analyse the structure of product manufacturing cost. Define the tasks and activities of operational production preparation. Explain the concept of operational production control. Analyse production planning and control activities, including production planning and production order release. Prepare basic production planning and control documentation. Describe inventory optimisation approaches. Define the tasks and activities of production operations. Explain the organisation of production operations. Define the tooling management function. Explain the tasks, activities and organisation of the tooling management function. Define the role of quality control in production. Explain the tasks, activities and organisation of the quality control function. Define the maintenance function. Explain the tasks, activities and organisation of the maintenance function.		
1.4. <i>Course content</i>		
Production as a business function and its role within a business system. Factors influencing the organisation of production. Organisational forms and fundamental production processes. Manufacturing process planning: tasks, activities and organisation. Manufacturing process documentation: product and process data, bills of materials, process routings, work instructions and time standards; digital production documentation. Manufacturing costs. Structure and calculation of product manufacturing cost. Direct and indirect costs. Average hourly rate and direct cost calculation methods. Basic elements of sales price calculation. Production planning and control. Production planning, material and capacity requirements planning, scheduling and sequencing of production activities. Production order release and shop-floor control. Monitoring production progress. Documentation and information flows supporting production planning and control. The role of contemporary ERP and MES systems in planning, executing and monitoring production.		

Inventory management: types and functions of inventory, inventory-related costs, basic inventory optimisation models and basic principles of determining order quantities and reorder points.

Organisation and management of production operations. Basic production performance indicators and monitoring of resource utilisation. Basic principles of visual management and continuous improvement of production processes. Tooling management: tasks, activities and organisation of the tooling function and contemporary approaches to tool availability and tool data management. Technical inspection and quality control in production: tasks, organisation, documentation, traceability and basic quality monitoring procedures. Maintenance of production equipment: organisation of the maintenance function, corrective and preventive maintenance, and basic contemporary approaches to maintenance management.

1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
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1.6. *Student obligations*

Completion of independent assignments, continuous assessment, independent study and completion of the final written examination.

1.7. *Monitoring student work (mark the appropriate boxes with an X)*

Class attendance		Participation in class	x	Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. *Assessment and evaluation of student work during classes and the final exam*

Student knowledge and performance are assessed continuously through problem-solving and practical assignments and through assessments of their understanding of the fundamental concepts of production organisation, planning and control. The final written examination includes theoretical questions and problem-solving tasks.

1.9. *Required readings and number of copies relative to the number of students currently taking the course*

Title	Number of copies	Number of students
Mikac, T.; Ljubetić, J.: "Organizacija i upravljanje proizvodnjom", Graphis, Zagreb; Tehnički fakultet Rijeka, Rijeka, 2009. (in Croatian)	1	10

1.10. *Supplementary readings*

Slack, N.; Brandon-Jones, A.; Burgess, N.: Operations Management, 5th Edition, 2018.

1.11. *Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.*

Through the Institution's quality assurance system.

GENERAL INFORMATION							
Course name	Professional Practice I						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	2.						
Number of credits and mode of delivery	ECTS student workload coefficient			5			
	Number of hours (L+P+S)			-			
Course description							
1.1. Course aims							
Student verifies and complements his own professional knowledge, along with a comprehensive view of the work process.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Apply acquired professional knowledge and skills from studied courses. Gain working process experience. Develop and further improve competence for solving practical engineering problems.							
1.4. Course content							
Professional practice within Undergraduate Vocational Study of Mechanical Engineering is carried out individually in work organization that is engaged in the student's field of study, and with activities in accordance with the Professional Practice Rules and with Study Program curriculum. Within professional practice, student meets with the corresponding jobs that are studied through programs of education, with the task of verifying and complementing their own expertise, along with a comprehensive view of the work process.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☐ lectures ☐ seminars and workshops ☐ practicals ☐ remote learning ☒ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Conducting professional practice in duration of 15 working days, or 120 hours, and writing the corresponding report .							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance		Participation in class		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Continuous assessment of knowledge		Student report	x	Practical work	x
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							

Assesses and evaluates student work and dedication, and written report.		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
1.10. <i>Supplementary readings</i>		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION							
Course name	Professional Practice II						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	3.						
Number of credits and mode of delivery	ECTS student workload coefficient			10			
	Number of hours (L+P+S)			-			
Course description							
1.1. Course aims							
Student verifies and complements his own professional knowledge, along with a comprehensive view of the work process.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Apply acquired professional knowledge and skills from studied courses. Gain working process experience. Develop and further improve competence for solving practical engineering problems.							
1.4. Course content							
Professional practice within Undergraduate Vocational Study of Mechanical Engineering is carried out individually in work organization that is engaged in the student's field of study, and with activities in accordance with the Professional Practice Rules and with Study Program curriculum. Within professional practice, student meets with the corresponding jobs that are studied through programs of education, with the task of verifying and complementing their own expertise, along with a comprehensive view of the work process.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☐ lectures ☐ seminars and workshops ☐ practicals ☐ remote learning ☒ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Conducting professional practice in duration of 30 working days, or 240 hours, and writing the corresponding report .							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance		Participation in class		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Continuous assessment of knowledge		Student report	x	Practical work	x
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							

Assesses and evaluates student work and dedication, and written report.		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
1.10. <i>Supplementary readings</i>		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION		
Course name	Protection of the Environment and Working Ambient	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. Course aims		
Develop the competence required to solve engineering problems in environmental protection: identifying pollution sources in energy and industrial plants and evaluating technical solutions for reducing and preventing emissions. Develop the competences required to identify hazards, harmful agents and work-related strains at the workplace, and to select technical and organizational measures for the prevention of occupational injuries and diseases.		
1.2. Course enrolment requirements		
None.		
1.3. Intended course learning outcomes		
Analyze the energy and industrial processes from the viewpoint of environmental protection. Describe the types and formation pathways of harmful emissions. Define and calculate the emissions to the atmosphere from combustion processes. Explain and calculate the impact of weather conditions on emissions. Define and describe the technical procedures for reducing pollutant emissions to the environment. Draw and describe the schematic diagrams of the main processes for the treatment of flue gases, wastewater and solid waste. Analyze and explain the factors influencing wastewater treatment processes. Describe the procedures for the reduction, treatment and recovery of waste from industrial processes. Define and describe the properties of hazardous waste. Describe the main procedures for the disposal of hazardous waste.		
1.4. Course content		
Introduction to environmental protection, basic concepts of environmental engineering, equilibrium and disturbances in the ecosystem. Pollution of the atmosphere, hydrosphere and lithosphere. Impact of energy and industrial plants on the environment. Emissions of pollutants via flue gases, wastewater and waste material. Consequences of pollution and measures for its reduction; emission limit values for pollutants. Flue gas cleaning, modification of combustion regimes, optimization of production processes. Wastewater treatment, treatment and recovery of waste material, remediation of pollution. The legal framework of environmental protection: environmental impact study and environmental protection report, environmental permit and best available techniques (BAT). Protection of the working environment, noise protection, prevention of occupational injuries and diseases, identification of workplace hazards, harmful agents and strains.		
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☒ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. Student obligations		

Course attendance, activity, studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam		Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Activity in class, continuous knowledge testing (two mid-term exams), written or oral exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Prelec, Z.: Energy Systems in the Process Industry, Školska knjiga Zagreb, 1994. (in Croatian)					10		-
Briški, F.: Environmental Protection, Element, Zagreb, 2016. (in Croatian)					1		-
Dundović, K., Perić, Z.: Organisation of Occupational Safety, Polytechnic of Rijeka, Rijeka, 2020. (in Croatian)					10		-
1.10. <i>Supplementary readings</i>							
Kiely, G.: Environmental Engineering, Mc Graw-Hill, International Editions, 1998. Feretić, D. and other: Power plants and the environment, Zagreb, 2000. (in Croatian)							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's system of quality control.							

GENERAL INFORMATION							
Course name	Quality Assurance VO						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	optional						
Year	3.						
Number of credits and mode of delivery	ECTS student workload coefficient			5			
	Number of hours (L+P+S)			45+15+0			
Course description							
1.1. Course aims							
The course is designed to provide the student with basic knowledge in quality assurance topics. Through exercises students are introduced with practical application of several course objectives.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
To interpret the meaning and importance of quality assurance. Explain the basic concepts of quality assurance and quality control. Classify quality characteristics of products, processes and services. Quality cost analysis. Interpret basic requirements of ISO 9001 standard. Apply basic quality tools. Assess results of statistical process control. Analyse R&R of measurement system. Measure process reliability and select acceptance sampling.							
1.4. Course content							
Definitions of quality. Quality of products, processes and services. Quality costs. Pareto principle. Economical level of quality. Optimal quality. Quality inspection. Quality assurance. International quality standards ISO 9000. Quality management. Total quality. Planning for quality. Quality improvement. Quality engineering. Method and tools for quality assurance and improvement. Cause-and-effect relationships. Causes of quality variability. Statistical process control methods. Common probability distributions. Control charts. Specification limits and tolerances. Products and processes quality assessment methods. Demerit method. Quality of measurement system. Acceptance sampling. Reliability.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, active participation in the course, attendance at laboratory exercises, homework and independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Sustained knowledge check (three midterm exams) and final written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
1.10. <i>Supplementary readings</i>							
Montgomery, D.C., Jennings, C. L., Pfund, M. E.: Managing, controlling, and improving quality, John Wiley & Sons Wiley, 2011.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name	Radiocommunications VO						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	optional						
Year	3.						
Number of credits and mode of delivery	ECTS student workload coefficient			5			
	Number of hours (L+P+S)			45+15+0			
Course description							
1.1. Course aims							
Students will acquire knowledge of the nature of radio-wave communications and major components of radiocommunication systems, from the source to a receiver. The course will provide the knowledge of key principles, phenomena, techniques, and components of the system.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Apply decibels and nepers. Distinguish the characteristics and implement key relations to analyze the wave propagation through an unguided medium. Explain the wave behavior on the boundary of two media. Apply the basics of wave propagation over a transmission line. Apply the Smith chart. Design a quarter-wavelength and binomial impedance transformer. Distinguish and apply the most used antenna parameters. State the propagation effects in a communication channel. Analyze simple RF link budgets. Evaluate frequency up- and down- conversion and image frequency.							
1.4. Course content							
Electromagnetic spectrum. Types of electromagnetic waves. A basic scheme of a radiocommunication system. Decibels and nepers. Plane wave in various media. Perpendicular and oblique wave incidence on media boundary. Transmission line model. The Smith chart. Quarter-wave impedance transformer. Binomial transformer. Fundamental antenna parameters. Communication channel and effects on the wave propagation. RF link budget. A brief overview of propagation models for field prediction. Intermodulation products. Frequency conversion. Image frequency.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Class attendance, literature reading, class preparation, and continuous studying.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	x
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Continuous knowledge examination (midterms) and final exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
D. M. Pozar, Microwave Engineering, 3rd ed., Wiley, 2005.					-		10
J. D. Parsons, The Mobile Radio Propagation Channel, 2nd ed, Wiley, 2000.					-		10
C. A. Balanis, Antenna Theory: Analysis and Design, 3rd ed, Wiley-Interscience, 2005.					-		10
1.10. <i>Supplementary readings</i>							
J. D. Parsons, The Mobile Radio Propagation Channel, 2nd ed, Wiley, 2000. C. A. Balanis, Antenna Theory: Analysis and Design, 3rd ed, Wiley-Interscience, 2005.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Ship Design	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+30+0
Course description		
1.1. <i>Course aims</i>		
Creating a sense of the complexity of ship design. Based on the basic knowledge of the technical requirements, and its application, achieving compliance with the general basis for the understanding of the important factors in designing vessels.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Describe the process of the design of the vessel and to analyze the phases of design. Define and describe the concept of design requirements and conceptual and preliminary project. Specify and analyze methods of preparing a preliminary project, and to determine the main characteristics of the ship. Define buoyancy, elements of form and execute verification of the buoyancy and stability in the intact and damaged condition. Analyze the rationality of subdivision (subdivision of marine spaces and tanks) and unsinkability. Make a preliminary calculation of propulsion and prognostic charts. Define specific weights iteratively in various stages of design. Make a general plan, technical description and learn about the classification documentation. Analyze and explain the application of computers for basic calculations in the design of the vessels. Acquaint yourself with the delivery documentation and delivery testing programs.		
1.4. <i>Course content</i>		
Introduction to the design of the vessel. Design phases of the vessel. Project application. The conceptual design. Preliminary project. Methods of preparing a preliminary project. Determination of the main characteristics of the ship. Determination of buoyancy, elements of ship form and checking buoyancy and stability in the intact and damaged condition. Subdivision and unsinkability. The choice of form and ship lines. Determination of power and choice of main propulsion machinery. Preparation of the general plan of the ship. Determination of marine spaces and tanks. Preliminary determination of weight. The final project. Technical description. Classification documentation. International regulations, standards and conventions and rules of classification societies related to the design of the vessel. Use of computers for basic design calculations. Delivery documentation and acceptance tests.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Attendance, class participation, homework, studying.		

1.7. Monitoring student work (mark the appropriate boxes with an X)

Class attendance	x	Participation in class		Seminar paper	x	Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. Assessment and evaluation of student work during classes and the final exam

Attendance, continuous assessment (2 mid-term exams), the project, written examination, oral examination, or any combination of these forms.

1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
Watson, D.: Practical Ship Design, Elsevier Science Ltd., Oxford, 1998.	1	6
Schneekluth, H., Bertram, V.: Ship Design for Efficiency & Economy, Butterworth Heinemann, Oxford, 1998.	1	6
Letcher, J.: Principles of Naval Architecture Series: The Geometry of Ships The Society of Naval Architects	1	6

1.10. Supplementary readings

Belamarić, I.: Ship and Entropy, Književni krug, Split, 1998. (in Croatian) Rules for Ship Technical Survey, Part 1.-8., Hrvatski registar brodova, Split, 1999. (in Croatian) Rawson, K.J., Tupper, A.C.: Basic ship theory, Volume 1 & 2, 2001.

1.11. *Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.*

Through a structured system of quality assurance of the Faculty.

GENERAL INFORMATION							
Course name	Ship Systems and Marine Auxiliary Machinery						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	optional						
Year	3.						
Number of credits and mode of delivery	ECTS student workload coefficient				5		
	Number of hours (L+P+S)				30+30+0		
Course description							
1.1. Course aims							
Obtaining theoretical knowledge and develop skills to solve practical problems in the field of ship systems and marine auxiliary machinery.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Describe and analyze ship propulsion systems of ships with diesel engine propulsion plants. Describe and analyze ship ballast and bilge systems. Describe and compare ship cargo heating and cargo loading and unloading systems. Describe and compare ship fire fighting systems. Describe elements of ship pipelines and pumps. Analyze pumps in serial or parallel connection and NPSH value. Describe parts and working principle of centrifugal separators. Describe and compare ship fresh water generators. Describe and compare types of heat exchangers on ships. Describe and compare hydraulic steering gears. Describe parts and design of ship shaft lines.							
1.4. Course content							
Generally on ship systems. Fuel oil systems. Ship cooling systems. Compressed air systems. Other ship engine systems. Ballast systems. Bilge systems. Sanitary systems. Fire fighting systems. Systems for cargo loading and unloading. Inert gas systems. Tank cleaning systems. Ship pumps. Heavy fuel oil and lubricating oil centrifugal separators. Filters. Heat exchangers. Types of ship propulsion plants, application and arrangement on ships. Marine steering gears. Shaft line. Marine reduction gears and propulsors.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, activity, homework, studying.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active participation in class, continuous knowledge testing (two mid-term exams), written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Ozretić, V.: Brodski pomoćni strojevi i uređaji, Split Ship Management, Split, 2004.					8		6
Smith, D. W.: Marine Auxiliary Machinery, 6 th edition, Butterworth-Heinemann, London, 2016.					1		6
1.10. <i>Supplementary readings</i>							
Martinović, D.: Brodski strojni sustavi, Digital point, Rijeka, 2005.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION							
Course name	Strength of Materials						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	1.						
Number of credits and mode of delivery	ECTS student workload coefficient			6			
	Number of hours (L+P+S)			30+30+0			
Course description							
1.1. Course aims							
Obtaining theoretical knowledge and develop skills to solve practical problems in the field of structural analysis and structural design.							
1.2. Course enrolment requirements							
Basic knowledge of rigid body statics.							
1.3. Intended course learning outcomes							
Define basic assumptions and terms in solid mechanics. Define strain and stress. Determine extreme stress values. Differentiate simple and compound stress states. Define Hooke's law. Differentiate simple and compound loading cases. Calculate strains and stresses at axial loading, shear and torsion. Calculate cross-section properties. Calculate strains and stresses at bending of beams. Define deflection lines of beams. Calculate critical buckling loads of columns. Calculate strains and stresses at compound loadings.							
1.4. Course content							
Introduction. Strains. Stress. Hooke's law. Axial loading. Shear. Torsion. Theories of strength. Cross-sectional properties of areas. Bending of beams. Deflection of beams in bending. Buckling of bars. Biaxial bending. Eccentric loading. Combined bending and torsion. Springs.							
1.5. Modes of delivery (mark the appropriate boxes with an X)	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☐ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____			
1.6. Student obligations							
Course attendance, laboratory experimental work, studying.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper		Experimental work	x
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							

1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>		
Course attendance, laboratory experimental work, continuous knowledge testing (mid-term exams), written and oral exam.		
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>		
Title	Number of copies	Number of students
Brnić, J., Turkalj, G.: " Strength of materials I", Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 2004. (in Croatian)	15	155
Brnić, J., Turkalj, G.: " Strength of materials II", Zigo, Rijeka, 2006. (in Croatian)	7	155
1.10. <i>Supplementary readings</i>		
Alfirević, I.: " Strength of materials I", Tehnička knjiga, Zagreb, 1995. (in Croatian) Šimić, V.: " Strength of materials I", Školska knjiga, Zagreb, 1992. (in Croatian) Seed, G.M.: "Strenght of Materials ", Saxe-Coburg Publications, Edinburgh, UK, 2000. (in Croatian)		
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>		
Through the Institution's quality assurance system.		

GENERAL INFORMATION							
Course name	Technical Drawing						
Study programme	Professional Undergraduate Study of Mechanical Engineering						
Course status	compulsory						
Year	1.						
Number of credits and mode of delivery	ECTS student workload coefficient			6			
	Number of hours (L+P+S)			30+30+0			
Course description							
1.1. <i>Course aims</i>							
The achievement of the proficiency in the development of 2D geometrical representations of 3D objects and implementation of traditional and computer techniques for geometrical modelling. The development of the ability to communicate design ideas using technical drawings in standard drafting formats.							
1.2. <i>Course enrolment requirements</i>							
None.							
1.3. <i>Intended course learning outcomes</i>							
Interpret and apply traditional and CAD techniques for the development of 2D geometrical model. Compare and distinguish the methods of shape description. Compare primitives/simple objects and interpret the creation of complex 2D objects. Interpret and apply ISO system of fits and tolerances, surface texture and geometrical tolerances. Note the role of standardization and standards. Interpret engineering graphics and create engineering documentation in accordance with standards. Estimate personal contribution and the contribution of lecturer to the acquisition of contents.							
1.4. <i>Course content</i>							
Graphical communications. The design process and the role of the design model. Traditional, 2D and basic 3D CAD techniques for the development of models. The description of shape and size: projection theory, multi-view drawings and sectional views, spatial representations. Standardization and standards. Purpose and application of fits and tolerances, surface textures and geometrical tolerances.							
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work			☒ independent work ☒ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. <i>Student obligations</i>							
Course attendance and activity (lectures, exercises), constructive works, continuous knowledge testing, homework, studying.							
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>							
Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	

Project	x	Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio		Homework	x				
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Course attendance, homework, 2 constructive works, continuous knowledge testing (2 exams), written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
M. Kljajin, M. Opalić: Engineering Graphics, Strojariski fakultet u Slavonskom Brodu, Slavonski Brod, 2010. (in Croatian)					10		20
G. Marunić, J. Butorac, S. Troha: Engineering Graphics, Collection of Shape Description Problems, Zigo Rijeka, Rijeka, 2008. (in Croatian)					10		20
Kraut` s Engineering Manual, SAJEMA, Zagreb, 2009. (in Croatian)					6		20
1.10. <i>Supplementary readings</i>							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution ´ s quality assurance system.							

GENERAL INFORMATION		
Course name	Technological Processes	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	optional	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	30+30+0
Course description		
1.1. <i>Course aims</i>		
Introduction to the key factors that influence the setting of a technological process. Acquisition of the knowledge, methods and procedures necessary for planning and improving processes. Introduction to the possibilities of applying modern production technologies and their impact on process characteristics.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Explain basic concepts in the production area. Analyze the influence of the production type and production flow mode on the technological process and its settings. Explain the influence of product performance on the process – technologicality. Analyze the elements of the technologicality of product parts. Explain and apply basic procedures for planning and managing a technological process. Distinguish between time categories when performing a production operation, determine the technical standard time and apply appropriate procedures for determining it. State the technological bases for process planning and analyses their influence on the results and process setup. Explain the specifics of technological preparation for processing on NC/CNC machines. Process planning for manufacturing a specific product and creating the corresponding basic technological documentation.		
1.4. <i>Course content</i>		
Fundamental concepts. Influential elements of the technological process. Influence of the production type and production flow mode on the technological process and its settings. Impact of product performance. Technological analysis of products and parts. Process planning. Production operations and their decomposition. Input material. Manufacturing datums. Technological parameters. Categories of time. Production and operating equipment. Technological baselines. Rigidity, vibrations, temperature, residual stresses. Machining allowances. Workpiece accuracy. Process capability. Effect of NC equipment on process characteristics. Specific features of technological preparations for NC/CNC machines. The coordinate system and its characteristic points. NC programme and its structure. Programme drawing, clamping plan, tool plan. Methods of NC programming. Data entry into the machine control unit. Implementation and monitoring of the process.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Course attendance, project development, self learning.		

1.7. Monitoring student work (mark the appropriate boxes with an X)

Class attendance	X	Participation in class		Seminar paper		Experimental work	
Written exam	X	Oral exam	X	Essay		Research	
Project	X	Continuous assessment of knowledge	X	Student report		Practical work	
Portfolio							

1.8. Assessment and evaluation of student work during classes and the final exam

Active class participation, two mid-term exams, project, and final written and/or oral exam.

1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
Gačnik, V., Vodenik, F.: Technological Processes Design, Zagreb 1990. (in Croatian)	4	10
Curis, M.A.: Process Planning, New York, 1988.	1	10
Jurković, M., Tufekčić, D.: Tehnological Processes, Design and Modelling, Tuzla. 2000. (in Croatian)	3	10

1.10. Supplementary readings

Mueller, G.: Gleichungen fuer Technologen. Veb Verlag Technik. 1988.

1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.

Through the Institution's quality assurance system.

GENERAL INFORMATION							
Course name		Technological Processes in Process Industry					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		optional					
Year		3.					
Number of credits and mode of delivery		ECTS student workload coefficient			5		
		Number of hours (L+P+S)			45+15+0		
Course description							
1.1. Course aims							
Developing skills and competencies involvement in technical issues and solving them during the design, construction and operation. Developing the capacity to identify technical problems, analyzing and making proposals for technical improvements.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Describe the technological processes in the process industry. Define and explain the main operating parameters of technological processes in the process industry. Develop and explain the basic scheme of technological process. Analyze and explain the factors influencing the efficiency of technological processes. Define and describe the main equipment of process plants. Calculate the main dimensions and operational parameters of equipment, machinery and devices in process plants. To analyze the economic size of technological processes in the process industry. Define and explain the safety requirements of process plants.							
1.4. Course content							
The introduction of technological processes in the process industry. Basic technological processes (physical and chemical): filtration, separation, aeration, degassing, degasification, evaporation, adsorption, desorption, extraction, neutralization, ion exchange, distillation, fractionation, rectification, thermal cracking, catalytic cracking, hydrocracking, reforming, hydrogenation. Biological processes. Technological installations in the oil industry, the petrochemical industry, the chemical industry and in other process industries. Automation of technological processes. Optimization. Advanced management, monitoring and analysis of technological process control, product quality, operating costs. The economic analysis of technological processes.							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☒ field work			☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, activity, studying							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	x	Participation in class		Seminar paper	x	Experimental work	

Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio							
1.8. Assessment and evaluation of student work during classes and the final exam							
Active class participation, continuous knowledge testing, written and oral exam.							
1.9. Required readings and number of copies relative to the number of students currently taking the course							
Title					Number of copies		Number of students
Janović Z.: <i>Naftni i petrokemijski procesi i proizvodi</i> ; HDGM Zagreb; 2011. (2. izdanje) (in Croatian)					Available online		10
Beer E.: <i>Priručnik za dimenzioniranje uređaja kemijske procesne industrije</i> ; HDKI Zagreb; 1994. (2. izdanje) (in Croatian)					1		10
1.10. Supplementary readings							
Ludwig E.E.: <i>Applied Process Design for Chemical and Petrochemical Plants</i> ; svezak 2; Coker, Gulf Professional/Elsevier; 2010. Cerić E.: <i>Tehnologija nafte</i> ; Školska knjiga Zagreb; 1984. (in Croatian) Cerić E.: <i>Nafta: Proces i proizvodnja</i> ; INA/Kigen Zagreb; 2006. (in Croatian)							
1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.							
Through the Institution's system of quality control.							

GENERAL INFORMATION		
Course name	Thermodynamics	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	2.	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	45+15+0
Course description		
1.1. <i>Course aims</i>		
Obtaining theoretical knowledge and develop skills to solve practical problems in the field of thermodynamics. Acquiring the knowledge required for attending lectures in the field of thermal and energy engineering.		
1.2. <i>Course enrolment requirements</i>		
Attended courses Mathematics I and Mathematics II.		
1.3. <i>Intended course learning outcomes</i>		
Define and describe the first and second laws of thermodynamics as well as the concept of thermal conditions. Define and describe the equation of state of an ideal gas and gas mixtures. Describe the ideal gas state changes. Describe and compare the thermal cycles. Compare and analyze the reversible and irreversible processes and define work losses due to the irreversibility. Describe state changes during evaporation and condensation. Describe, compare and analyze processes of steam plants. Describe and analyze the thermal behaviour during combustion. Describe and compare the processes of internal combustion engines. Describe and analyze the exchange of energy in the flow through the nozzle. Define, describe and compare basic types of heat transfer and describe the heat transfer within the heat exchanger. Describe and analyze the changes and processes with humid air. Apply acquired knowledge to solve thermodynamic tasks (practical problems).		
1.4. <i>Course content</i>		
Thermal state. The first law of thermodynamics. Ideal and real gas. Equation of state. Work. pV-diagram. Specific heat capacity. Gas mixtures. Ideal gas state changes. Thermodynamic cycles. Carnot cycle. The second law of thermodynamics. Reversible and irreversible processes. Irreversibility and work. Entropy and irreversibility. Maximal work. Technical work. Damping. Enthalpy. Mixing of gases. Losses due to the irreversibility. Processes of internal combustion engines. Evaporation and condensation. The heat exchange during evaporation. State changes of saturated steam. Superheated steam. Processes of steam plants. Mollier hs-diagram. Exergy. Combustion. Thermal phenomena during combustion. Energy exchange in the flow. De Laval nozzle. Fundamentals of heat transfer. Heat conduction. Heat transfer by convection. Heat transfer by radiation. Overall heat transfer. Heat exchangers. Humid air. Mollier hx-diagram. Humid air state changes. Humid air application.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☐ field work	☒ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Course attendance, activity, homework, studying.		

1.7. Monitoring student work (mark the appropriate boxes with an X)

Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio		Homework	x				

1.8. Assessment and evaluation of student work during classes and the final exam

Activite class participation, homework, continuous knowledge testing (three mid-term exams), written and oral exam.

1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
Bošnjaković, F.: Thermodynamics, Vol. I, II and III (reprint editions of 1978, 1976 and 1986), Graphis d.o.o., Zagreb, 2012. (in Croatian)	38	15

1.10. Supplementary readings

Galović, A.: Thermodynamics I, (book), Fakultet strojarstva i brodogradnje, Zagreb, 2007. (in Croatian)

Galović, A.: Thermodynamics II, (book), Fakultet strojarstva i brodogradnje, Zagreb, 2007. (in Croatian)

1.11. *Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.*

Through the Institution's quality assurance system.

GENERAL INFORMATION							
Course name		Tools, Jigs and Fixtures					
Study programme		Professional Undergraduate Study of Mechanical Engineering					
Course status		optional					
Year		2.					
Number of credits and mode of delivery		ECTS student workload coefficient			6		
		Number of hours (L+P+S)			30+30+0		
Course description							
1.1. Course aims							
Acquisition of theoretical and practical knowledge through concrete examples in the fields of tooling (machining, metal forming), jigs and fixtures.							
1.2. Course enrolment requirements							
None.							
1.3. Intended course learning outcomes							
Explain basic design of tools, jigs and fixtures. Define design parameters for metal cutting tools. Define design parameters for metal forming tools. Define design parameters for jigs and fixtures. Explain principle of special workholding design and modular principle of design. Explain of basic application of software's at tools, jigs and fixtures design. Make according instructions estimate and design of die and/or fixtures and/or metal cutting tool for real example.							
1.4. Course content							
Basic design of tool. Responsibility of designer for material chooses and production aim of tool/fixtures. Material for tool and fixtures. Accuracy of machining. Design of metal cutting tool. Basic principle of workholding. Design of tool holder. Die design for stamping. Die design for bending, drawing and cold extrusion. Tool control design. Fixtures design for special purpose, common and modular principle. Modular tools and automated systems for manipulation and storage tools. Basic principles of optimization tools/fixtures. Computers application on tool and fixtures design (CAD/CAM technologies).							
1.5. Modes of delivery (mark the appropriate boxes with an X)		☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☒ field work			☒ independent work ☐ multimedia and network ☒ laboratory ☐ supervision ☐ other _____		
1.6. Student obligations							
Course attendance, preparation of seminar paper and independent learning.							
1.7. Monitoring student work (mark the appropriate boxes with an X)							
Class attendance	×	Participation in class		Seminar paper	×	Experimental work	
Written exam	×	Oral exam		Essay		Research	

Project		Continuous assessment of knowledge	×	Student report		Practical work	
Portfolio							
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Active class participation, preparation of seminar paper, sustained knowledge check and written exam.							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies		Number of students
Tadić, B., Vukelić, Đ., Jurković, Z.: Tools, Jigs and Fixtures, ISBN: 978-86-6335-000-7, Fakultet inženjerskih nauka u Kragujevcu, Kragujevac, 2013. (in Serbian)					2		10
Grizelj, B.: Tools, Jigs and Fixtures, ISBN: 953-6048-26-4, Strojarški fakultet u Sl. Brodu, 2004. (in Croatian)					2		10
Grizelj, B., Seuček, I.: Cutting Tools, ISBN: 978-953-6048-41-0, Strojarški fakultet u Sl. Brodu, 2007. (in Croatian)					2		10
Margić, S., Rebec, B.: Stamping Machines, Fakultet strojarstva i brodogradnje, Zagreb, 1987. (in Croatian)					1		10
1.10. <i>Supplementary readings</i>							
Boljanovic, V.: Die design fundamentals, Industrial Press, ISBN: 9780831131197, 2005.							
Čuš, F.: Jigs and Fixtures for Machining Processes, Maribor, ISBN: 86-435-0608-7, 2004. (in Slovenian)							
Hodolič, J., Vukelić, Đ.: Jigs and Fixtures, ISBN: 978-86-7892-121-6, Fakultet tehničkih nauka, Novi Sad, 2008. (in Serbian)							
Rebec, B.: Cutting Tools, Fakultet strojarstva i brodogradnje, Zagreb, ISBN: 86-329-023, 1990. (in Croatian)							
Margić, S.: Jigs and Fixtures, Tehnički fakultet Rijeka, 1980. (in Croatian)							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							

GENERAL INFORMATION		
Course name	Welding Engineering	
Study programme	Professional Undergraduate Study of Mechanical Engineering	
Course status	compulsory	
Year	3.	
Number of credits and mode of delivery	ECTS student workload coefficient	5
	Number of hours (L+P+S)	30+15+0
Course description		
1.1. <i>Course aims</i>		
The course is designed to provide the student with basic knowledge in welding engineering topics. Student is introduced with practical application of several welding processes.		
1.2. <i>Course enrolment requirements</i>		
None.		
1.3. <i>Intended course learning outcomes</i>		
Classify welding processes and welding power sources. Analyse the formation of a welded joint based on the characteristics of the electric arc and heat input. Select the welding process and conditions (e.g. preheating) with regard to the weldability of alloy steels, cast iron and aluminium and copper alloys. Select welding consumables and the type of welded joint according to design requirements. Calculate the required power, electrical energy consumption and filler material consumption in arc welding. Evaluate the quality of a welded joint and determine the welding plan and sequence.		
1.4. <i>Course content</i>		
Development and classification of welding processes. Pressure welding processes. Fusion welding processes. Fundamentals of mechanisation, robotisation and automation of arc welding. Arc welding and its characteristics. Static characteristic of the arc. Heat power and calculation of heat input. Welding power sources, required connected load, welding parameters and power source equipment. Transfer of molten metal by the electric arc. Structure of the welded joint and the heat-affected zone. Weldability, crack occurrence, preheating. Specific features of welding alloy steels. Design of the welded joint, terminology and definitions. Basic types and designation of welded joints. Filler and auxiliary materials in welding. Coated electrodes. Electrical energy consumption. Welding productivity indicators. Classification of welding defects. Welding quality control. Basic concepts of welding procedure specification and qualification (WPS and WPQR) according to applicable standards.		
1.5. <i>Modes of delivery (mark the appropriate boxes with an X)</i>	☒ lectures ☐ seminars and workshops ☒ practicals ☐ remote learning ☒ field work	☐ independent work ☐ multimedia and network ☐ laboratory ☐ supervision ☐ other _____
1.6. <i>Student obligations</i>		
Course attendance, active participation in the course, attendance at on-site training, homework and independent learning.		
1.7. <i>Monitoring student work (mark the appropriate boxes with an X)</i>		

Class attendance	x	Participation in class		Seminar paper		Experimental work	
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment of knowledge	x	Student report		Practical work	
Portfolio				Field work	x		
1.8. <i>Assessment and evaluation of student work during classes and the final exam</i>							
Continuous assessment and a written final exam							
1.9. <i>Required readings and number of copies relative to the number of students currently taking the course</i>							
Title					Number of copies	Number of students	
Lecture notes					Available on Merlin		
1.10. <i>Supplementary readings</i>							
Meden, G., i dr.: Osnove zavarivanja, Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 2000. (in Croatian)							
Sinnes K.: Welding Handbook, Vol. 1, Welding Technology, AWS, American Welding Society, 2018							
O'Brien, A.: Welding Handbook, Vol. 2, Welding Processes, AWS, Miami, 2013.							
1.11. <i>Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences.</i>							
Through the Institution's quality assurance system.							