U N I V E R S I T Y O F S P L I T

FACULTY OF MARITIME STUDIES

ELABORATE PROPOSAL OF THE STUDY PROGRAMME

University graduate study programme in

MARINE ENGINEERING

SPLIT, 2025

GENERAL INFORMATION ON HIGHER EDUCATION INSTITUTION

Name of higher education institution	University of Split, Faculty of Maritime Studies
Address	Ruđera Boškovića 37, 21000 Split, Croatia
Phone	+385 21 619 399
Fax	+385 21 619 499
E-mail	office@pfst.hr
Internet address	https://www.pfst.unist.hr/

GENERAL INFORMATION ON THE STUDY PROGRAMME

Name of the study programme	Marine Engineering		
Provider of the study programme	University of Split, Faculty of Maritime Studies		
Other participants	N/A		
Type of study programme	Vocational study programme ☐	University study programme ☒	
Level of study programme	Undergraduate ☐	Graduate ☒	Integrated ☐
	Postgraduate ☐	Postgraduate specialist ☐	Graduate specialist ☐
Academic/vocational title earned at completion of study	Master of Science in Marine Engineering (univ. mag. ing. nav. mech.)		

1. INTRODUCTION

1.1. Reasons for performing the study programme

The essential goal of the systematic education of maritime experts is to access, master, apply and maintain modern techniques and technologies, and to meet the new requirements emerging in maritime and other industries, so that they could be able to efficiently manage, maintain and develop maritime economy as a whole. The education system will enhance individual abilities and thus strengthen the structures that will competently respond to the challenges associated with the development of maritime economy in the Republic of Croatia and across the world. There has been a substantial lack of marine engineers and related professions in the global merchant fleet, and Croatian seafarers have always been appreciated and in demand.

Basic objectives of the graduate Marine Engineering study programme include:

- Continuing regular education for acquiring highest seafaring ranks on board Croatian and international vessels: Chief Engineer and Second Engineer Officer on ships powered by main propulsion machinery of 3000 kW propulsion power or more (STCW III/2),
- Education for performing technical supervision of the vessels and technical management in sea-borne shipping,
- Continuing education and training of seafarers aimed at raising safety culture and environmental awareness,
- Scientific approach to the revival of Croatia's maritime economy,
- Continuing increase in the quality of education of maritime professionals in accordance with the global and EU standards and in line with the Bologna declaration principles.

The essential features of this study programme are:

- Conformity with national and international regulations and conventions,
- International equivalence of degrees and titles,
- Particularity of the education of seafaring officers and personnel in charge of technical supervision of the vessels, which is reflected in the outstanding permeation of the scientific and professional work.

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

With regard to the market demands in public and private sectors, this study programme represents the response to continuous demands of the maritime shippers for competent personnel who are able to perform technical supervision of the sea-going vessels as complex technical and technological systems, and to act as technical managers who are thoroughly familiarised with the shipping business and other systems in maritime affairs.

The study programme interacts with all economy sectors and a variety of scientific areas. It also forms the groundwork for efficient performance of entrepreneurship and relevant social and state structures. On successful completion of the programme, the acquired competences enable the students to be employed by companies engaged in maritime affairs, maritime transport and other companies in charge of the implementation and management of traffic, especially those involved in sea traffic processes.

1.3. Compatibility with requirements of professional organizations

The learning outcomes and the main goals of the study programme are harmonised with the requirements of the *Standards of Training, Certification and Watchkeeping Convention* (STCW 78/95), IMO Model Course 7.02 developed and recommended by the International Maritime Organization and the national *Regulation on Requirements for the Award of Ranks and Certification of Seafarers*. These requirements are embedded at the undergraduate level. Upon completing this level, graduate students acquire knowledge and skills required for performing technical supervision of the vessels and technical management in sea-borne shipping, in line with the certification requirements of the classification societies and the ISM and ISPS Codes.

1.4. Partners outside the higher education system that express interest in the study programme

The graduate Marine Engineering programme has been designed to enable the students to find employment not only in the area of marine engineering, but also in various maritime and transport institutions and companies engaged in marine industries. Therefore, the possible external partners include national and foreign shippers, maritime training and crewing agencies, shipyards, overhaul providers, classification societies such as Croatian Register of Shipping, etc.
The Faculty of Maritime Studies in Split have already established diverse business and technical cooperation with the institutions and companies whose core or secondary activities are connected with maritime shipping.

1.5. Financing

The study programme is primarily financed by the Ministry of Science, Education and Sports and, to a lesser extent, by the Faculty's revenues allocated for specific purposes.

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

While designing the study programme, close attention was paid to the harmonisation of the courses with those developed by other respectable foreign institutions, in order to achieve the compatibility and comparability of the curricula.

The matter of correspondence of the curriculum and syllabi of the graduate study in Marine Engineering with similar programmes performed by foreign higher education institutions, requires further explanation. Education of maritime specialists takes a wide variety of forms in the world and there are no two countries with identical education systems. This applies to almost all studying aspects: enrolment requirements, purpose and goals, types and organisation of studies by vocations, study duration, degrees and titles acquired at various institutions, names of higher education institutions, etc.
An analysis of cognate institutions engaged in education of seafarers and maritime professionals across the world, particularly in the European Union, has indicated a high level of comparability of study programmes with the following institutions:

- Universitat Politècnica de Catalunya, Spain (study programme in Management and Operation of Marine Energy Facilities, link: https://www.upc.edu/en/masters/the-management-and-operation-of-marine-energy-facilities),
- Faculty of Maritime Studies, University of Rijeka, Croatia (study programme in Marine Engineering and Maritime Transport Technology, link: http://pfri.hr/web/hr/studij_dip_BS.php),
- Vestfold College of Maritime Studies, Norway,
- Cork Institute of Technology, Ireland (link: https://www.cit.ie/course/CR095),
- Massachusetts Maritime Academy, USA,
- Admiral Mararov University of Maritime and Inland Shipping, St. Petersburg, Russia.

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

Compatibility and comparability with cognate study programmes at the above universities, as well as other maritime schools and other foreign higher education institutions, with which the Faculty of Maritime Studies in Split has established various ways of cooperation, enable the implementation of the Bologna principles: compatibility and mobility of the programmes, teachers and students.
The programme is open to mobility across the other study programmes at the Faculty of Maritime Studies in Split, related study programmes at the University of Split, cognate programmes at other Croatian universities (Faculty of Maritime Studies in Rijeka, Maritime Departments at the Universities of Dubrovnik and Zadar, Faculty of Transport and Traffic Sciences in Zagreb, etc.). Mobility is also enabled for related study programmes at foreign higher education institutions, in particular those in the EU area.

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

Graduate university study programme in Marine Engineering fully conforms to the mission and strategy of the Faculty of Maritime Studies in Split and to the strategic goals as laid out in the Strategy of the University of Split for the period 2021-2025.

1.9. Current experiences in equivalent or similar study programmes

The subject matter needed for the education of seafarers in line with the STCW 1978/95 Convention has been incorporated into the present three-year undergraduate programme, whereas the two-year graduate programme enables the acquired knowledge and skills to expand, while offering – at the same time – an opportunity to gain new insights and knowledge that are required in shore-based professions.
It is worth pointing out that the present graduate programme in Marine Engineering has been harmonised with the Bologna declaration principles, current trends in the world and the latest scientific insights, but also with other Faculties of Maritime Studies in Croatia. Owing to the experience and understanding of the issues related to the education of seafarers, the programme has been modernised in terms of organisation, substance and approach.
The study programmes created and conducted at the Faculty of Maritime Studies in Split are direct successors to the programmes that have been performed at this school for over sixty years. The Faculty is the only constituent unit of the University of Split, which has delivered study programmes in this area of education.

2. DESCRIPTION OF THE STUDY PROGRAMME

2.1. General information

Scientific/artistic area of the study programme	Technical sciences, the field of Traffic technology and transport
Duration of the study programme	2 years
The minimum number of ECTS required for completion of study	120
Enrolment requirements and admission procedure	Completed the undergraduate university study programme in Marine Engineering or a cognate undergraduate university study programme.

2.2. Learning outcomes of the study programme (name 15-30 learning outcomes)

1. Classify and assess the engine components on board ship, which have to comply with the environment safety and protection requirements (statutory components) and the functional requirements (classification components).
2. Identify and apply the relevant regulations on ships, vessels, boats, yachts and offshore marine structures.
3. Organise the fleet manager's tasks and conduct the inspection of the vessels.
4. Estimate and evaluate the production, installation and testing of onboard machinery components, on the basis of the approved technical documents, make comments and recommendations and follow up their implementation.
5. Assess the remarks of the shipowner regarding the newbuilding project that has been designed by the shipyard (technical description, general plan and list of suppliers), and establish whether these remarks are justified with regard to the contracted technical description or a previous requirement for the commissioned machinery components and systems.
6. Participate in the shipowner's expert team in the ship delivery trials of the newbuilding's engine components and systems; manage warranty claims.
7. Recommend and create ship's manuals referring to the engineering staff duties on board.
8. Assess the need for an overhaul and/or modification of a part, set, mashine, device and/or equipment in the ship machinery system.
9. Define the project specification's and costs, and monitor / control the costs of the project.
10. Manage the performance of the overhaul / modifications and final testing of the ship's machinery system.
11. Evaluate and prepare the ship for breaking (anticipate the safe ship recycling ensuring the environment safety in line with the international conventions).

12. Manage the quality system control aimed at safe ship management, security, and environmental protection (Quality Management Systems ISM, ISO 14001, OHSAS).

2.3. Employment possibilities

Potential employers include national and international shipping companies, local and state administration, maritime training and crewing agencies, companies engaged in marine industries, such as shipyards, overhaul providers, classification societies, etc.

2.4. Possibilities of continuing studies at a higher level

Graduate students holding a MSc degree in Marine Engineering can apply for doctoral studies in Technologies in Maritime Industry at the Faculty of Maritime Studies in Split and doctoral studies at the Faculty of Maritime Studies in Rijeka, at the Faculty of Transport and Traffic Sciences in Zagreb, and in other cognate doctoral studies.

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

This graduate study programme can be taken by a student that has completed a university undergraduate study in Marine Engineering or a cognate university undergraduate programme at a Maritime, Transport, Traffic or Technical faculty.

2.6. Structure of the study

The graduate study programme in Marine Engineering lasts 2 years over 4 semesters. By completing the programme students earn a total of 120 ECTS credits.
Requirements for the admission to the next semester, or the next year of the study, are defined in accordance with the Ordinance on Study Programmes and Study System of the University of Split, Regulations on studying at the Faculty of Maritime Studies in Split, and with Faculty Board's decisions.
A student who interrupted his/her student activities may be granted permission to resume attending the study programme, in accordance with the Regulations on studying at the Faculty of Maritime Studies in Split and with the Faculty Board's decisions. The same bodies shall decide whether to grant the permission to resume and complete the study programme at the Faculty of Maritime Studies in Split to a student who has lost his/her student rights at other higher education institution. This decision shall specify the terms and set the deadlines for fulfilling necessary obligations.
The size of student groups during lectures, practical training, exercise and other forms of teaching has been organised in line with the relevant standards and available space and staff. As a rule, the group size in lectures depends on the overall number of the students enrolled in individual courses, whereas the group size in exercise is up to 35 students. Groups attending exercise and practical training at computer workshops are

limited by the number of computers to 16-20 students. The size of a group attending any form of exercise allows efficiency and interactive approach to students.

2.7. Guiding and tutoring through the study system

At the Faculty of Maritime Studies in Split there is no formal student counselling service. However, Head of the Study Programme constantly maintains communication with students, providing advice and individual guidance when necessary. The Dean and the Vice Dean for Education have regular consultation hours.

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

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

The following courses can be performed in English language:

- Materials for marine applications
- Database application
- Special topics on structural metallic materials
- Marine propulsion system.

2.10. Criteria and conditions for transferring the ECTS credits

It is possible to transfer ECTS credits between different study programmes. The criteria and conditions for transferring ECTS credits are defined by the Regulations on Studies and Study System at the University of Split and by the Regulations on Studying at the Faculty of Maritime Studies in Split.

2.11. Completion of study

Final requirement for completion of study	Bachelorl thesis ☐ Diploma thesis ☒	Bachelor exam ☐ Diploma exam ☐
Requirements for final/diploma thesis or final/diploma/exam	Requirement for applying for Master thesis is having passed all the exams included in study curriculum.	
Procedure of evaluation of final/diploma exam and evaluation and defence of final/diploma thesis	In compliance with the Faculty Ordinance on Graded Assignments, and the Study Curriculum	

2.12. List of compulsory and elective courses

LIST OF COURSES							
Year of study: 1							
Semester: 1							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFP114	Applied mathematics	30		45		6
	PFS231	Risk management	45		15		6
	-	Vibrations in marine engines	15		15		4
	PFS216	Marine engine control	30		15		4
	Total		120		90		20
Elective	PFS212	Marine refrigerating and air-conditioning systems	30		15		4
		Materials for marine applications	30		15		4
	PFN209	Quality management in shipping	30		15		5
	PFP141	Scientific research methodology	30		0		4
	PFP140	Maritime science	30		0		3
	The student selects elective courses to earn at least 60 ECTS credits in the 1st year of study.						

LIST OF COURSES							
Year of study: 1							
Semester: 2							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFS214	Maintenance management II	45		15		7
	PFS107	Ship structural mechanics	30		30		6
	PFE109	Technical systems computer control	30		15		4
	PFS209	Marine power systems	45		15		6
	-	Mechanisms in marine engines	15		15		4
	Total		165		90		27
Elective	PFP117	Operational research	15		30		5
	PFN218	Green technologies in maritime affairs	30		15		5
	PFP217	Shipping finance	30		15		4
	PFP313	Database application	30		15		5
	PFN208	Pollution removal technology	30		15		4

		Remote sensing in a function of sustainable development of the maritime sector	15		30		4
	The student selects elective courses to earn at least 60 ECTS credits in the 1st year of study.						

LIST OF COURSES							
Year of study: 2							
Semester: 3							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFN203	Sea accident investigation	30		15		5
	PFS206	Marine propulsion system	30		15		6
	PFS236	Power efficiency of modern marine power systems	30		15		5
	Total		90		45		16
Elective	PFE110	New diagnostics and control technologies	30		15		4
		Chapters on structural metal materials	30		15		4
	PFS228	Complex machinery in exploitation technologies	30		15		4
	PFE312	Renewable energy sources	30		15		4
	PFS501	Internship	0		150		5
	The student selects elective courses to earn at least 60 ECTS credits in the 2nd year of study.						

LIST OF COURSES							
Year of study: 2							
Semester: 4							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFS207	Marine plant optimisation	30		15		4
	PFS237	Modelling and simulation of ship systems	45		30		5
	PFP310	Business systems	30		15		3
	PFS238	Project	0		75		5
	PFS500	Master thesis	0		30		15
	Total		105		165		32

2.13. Course description

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">APPLIED MATHEMATICS</td></tr>
<tr><td>Code</td><td>PFP 114</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Tatjana Stanivuk, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Goran Kovačević, MMath</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>-</td><td>45</td><td>-</td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">10</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Enable the student to apply mathematical methods necessary for accessing new forms of business and modern technology in maritime affairs, as well as to engage in scientific work in the aforementioned field.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Select the appropriate method of solution of double integrals;
2. Recommend a suitable solution of curve and plane integrals;
3. Apply Laplace transforms in solving differential equations;
4. Formulate mathematical problems in practice and choose a suitable numerical procedure for solving mathematical problems;
5. Determine the magnitude of the solution approximation error and choose the appropriate methodology for solving mathematical problems;
6. Analyse and evaluate the impact of individual variables on the studied phenomenon;
7. Valorise graphic and numerical methods;
8. Apply probability concepts in solving engineering problems;
9. Provide arguments for setting and testing the hypothesis procedure, and evaluate the outcome of hypothesis adoption / rejection.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the course. Dual integrals and application;
2. Curve integral of the first and second kind;
3. Application of curve integrals and Green's formula;
4. Plot integral of the first and second types and applications;
5. Laplace transforms.
6. Selected chapters of numerical mathematics: errors in numerical computation;
7. Interpolation;
8. Numerical solution of equations;
9. Numerical integration.
10. Introduction to probability and statistics. Combinatorics;
11. Definition and basic features of probability;
12. Random variables;
13. Numerical characteristics of random variables;
14. Descriptive and inferential statistics;
15. Testing statistical hypotheses.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Exercises:
1. Double integrals and application;
2. Curve integral of the first and second kind;
3. Application and Green's formula;
4. Plot integral of the first and second types and applications;
5. Laplace transforms.
6. MIDTERM TEST 1. Errors in numerical computing;
7. Interpolation;
8. Numerical solution of equations;
9. Numerical integration.
10. MIDTERM TEST 2. Combinatorics;
11. Examples of probability and conditioned probability;
12. Random variables;
13. Numerical characteristics of random variables;
14. Methods of descriptive and methods of statistical conclusion;
15. Testing statistical hypotheses. MIDTERM TEST 3.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☒ multimedia
☐ laboratory
☐ work with mentor
☐ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:
Full-time students are required at least 80% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits. Active participation in class and taking midterm exams (3 partial exams) during the semester. In case of passing all 3 midterm exams, the students do not have to take the final exam that takes place in the examination period. Students apply for examination through the on-line service (“Studomat”). In the event of insufficient attendance, students cannot apply for the exam and have to re-register the course in the following academic year.

Obligations of part-time students:
differ from those of full-time students in terms of:
1. Attendance: at least 50% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits.
2. Midterm exams: the timing can be agreed with the course teacher in case a student cannot take the exam with other students for justified reasons.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.875</td><td>Research</td><td>0.5</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests or Final test</td><td>3.125</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Practical work</td><td>0.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time and part-time students:

Students' activity in class is assessed over the semester. During the semester, students are continuously assessed through three written midterm tests that take place in 6th, 10th and 15th week of the semester. The final written/oral exam is not obligatory for the students who have passed all the midterm tests.</td></tr>
</table>

A student has to achieve **at least 50% of points to pass a midterm exam**.
In case a student passes all midterm tests, he/she does not have to take the final exam.
A **partial final exam** is available to the students who have failed one or two midterm tests – the partial exam covers the area that the students have not mastered.
The grade earned in the written part of the exam is formed as the **average value** of the points achieved through the midterm or final exam.
Class attendance and activity are evaluated and added to determine the **final grade**.
A student can alter the final grade by writing a **seminar paper** during the semester. During the semester, students will conduct independent research and complete practical work, which is one of the components of the final grade.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	31.4
Practical work	100	8.3
Research	100	8.3
Midterm test 1	50	17.33
Midterm test 2	50	17.33
Midterm test 3	50	17.33

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:

Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
Teaching material available on Merlin e-learning platform; https://moodle.srce.hr/2021-2022/	-	Yes
Benšić, M., Šuvak N., (2014), *Uvod u vjerojatnost i statistiku*, University of J. J. Strossmayer, Department of mathematics, Osijek.	15	Yes
Demidovič B. P. et al., *Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete*, Tehnička knjiga, Zagreb, 1995.		Yes

	Draščić Ban, B., Poganj T., *Primijenjena matematika*, Faculty of Maritime Studies in Rijeka, 2009.	4	Yes
	Elezović, N., *Fourierov red i integral / Laplaceova transformacija*, Element, Zagreb, 2010.		Yes
	Kovač Striko E., Kapetanović N., Ivanković B., *Vjerojatnost i statistika*, script, 2005.	15	
	Tomašević M., Ristov P., Stanivuk T., *Statističke metode u istraživanju*, Split, 2007.	15	
Optional literature (at the time of submission of study programme proposal)	1. B. Apsen: *Repetitorij više matematike III. dio*, Tehnička knjiga d.d. Zagreb, 1994. 2. N. Elezović: *Vjerojatnost i statistika. Slučajne varijable*, Element, Zagreb, 2007. 3. I. Ivanšić: *Funkcije kompleksne varijable. Laplaceova transformacija*, SN Liber, 1987. 4. Ž. Pauše: *Riješeni primjeri i zadaci iz teorije vjerojatnosti i statistike*, script, Zagreb, 1990. 5. R. Scitovski: *Numerička matematika*, University of Osijek, 2004. 6. I. Šošić: *Primijenjena statistika*, Školska knjiga, Zagreb, 2004. 7. P. Vranjković: *Zbirka zadataka iz vjerojatnosti i statistike s uputama i rješenjima*, Školska knjiga, Zagreb, 1992.		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">RISK MANAGEMENT</td></tr>
<tr><td>Code</td><td>PFS231</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teachers</td><td>Đorđe Dobrota, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the proactive approach to the safety in maritime affairs, based on the concept of risk. By using the functional analysis of faults in engine components as the causes of risk on board ships, the students are introduced into fault modelling and allocating the parameters to the reliability model on the basis of the available data. Through the framework of the Formal Safety Assessment (FSA) as IMO option for risk reduction, students are familiarised with the risk modelling, assessment and control.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Understand the concept of risk in maritime shipping.
2. Classify the faults of engine components as causes of risk on board.
3. Formulate and design the model of failure.
4. Assess the suitability of data for the analysis of reliability.
5. Calculate the parameters of the model of reliability for engine components.
6. Identify and assess the risk of failures of the engine components as the initial events, i.e. causes of risk, in the scenario of maritime accident.
7. Analyse and evaluate the potential undesired consequences in the event of maritime accident.
8. Anticipate the suitable risk management.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the course. Concept of the risk. Mathematical definition of the risk.
2. Causes of risk and the Formal Safety Assessment (FSA) as the framework for assessing the risk in maritime shipping.
3. Risk analysis. Qualitative and quantitative analysis of the risk.
4. Quantitative analysis of the technical system.
5. Methods of functional analysis.
6. Risk analysis. The concept of failure and failure categorisation.
7. Methods and tools used in failure analysis. Models of failures.
8. Sources and relevance of the data used in analysing the reliability and risks.
9. Reliability analysis of faulty systems.
10. Modelling of dependable faults.
11. Modelling of rare events.
12. Analysis of the accident scenario. Identification of the danger and assessment of its frequency and effects. Analysis of sensibility.
13. Risk evaluation. Evaluation of risk analysis by risk criteria.
14. Risk management.
15. Human reliability analysis (HRA).
Exercises:</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">1. Description of the frequency and subjective approach to probability.
2. Example of the block diagram of a technical system.
3. Example of the function analysis through the method of structural analysis and design technique (SADT).
4. Example of the function analysis through the method of function analysis of the system technique (FAST).
5. Example of detecting faults by using the concept of failure modelling.
6. Example of the failure analysis through the technique of analysing the modes, effects and critical features of failures (FMECA).
7. Example of the failure analysis through the fault tree analysis (FTA).
8. Example of the failure models.
9. Determining the parameters of the fault model based on the generic database.
10. Example of modelling the reliability of the irreparable components.
11. Example of modelling the reliability of the irreparable components and the system dependency through the Markov method.
12. Example of modelling the faults as rare events by applying the Bays framework.
13. Example of analysing an accident scenario with the identification of danger and the assessment of its frequency by using the risk matrix.
14. Example of the failure assessment and risk evaluation.
15. Example of the HRA methods.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance (lectures + exercise) in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam by creating and presenting a seminar paper.
Students who have fulfilled other course obligations but have not completed the seminar paper have to register for the final exam in the examination period.
Students are assigned tasks to be carried out through individual or team work, using the e-learning material.
Students who have achieved enough class activity points and have passed the midterm exams are expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grades or to take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>E-learning</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>4.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
</table>

equal to the ECTS value of the course)	Written exam		Project		(Other)	

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

Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. The first comprises Lectures 1-6 and is held in the 7th week, while the second midterm test comprises Lectures 7-12 and is held in the 15th week of the semester. Sample tests and exam questions are available at Merlin e-learning platform. A student has to achieve at least 50% of points to pass a midterm exam. Students who fail or miss a midterm exam for justified reasons, can re-take the test (1st midterm test in the 15th week of the semester, 2nd midterm test during the examination period. In case a student has fulfilled all course obligations but has missed / failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance, results of the midterm tests and individual/team assignments. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	20
Midterm test 1.	50	40
Midterm test 2.	50	40

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
M. Rausand: *Risk Assessment Theory, Methods and Applications*, John Wiley & Sons, Inc., New Jersey, 2011.		
M. Rausand, A. Høyland: *System Reliability Theory, Models, Statistical Methods and Applications – 2nd Edition*, John Wiley & Sons, Inc, New Jersey, 2004.		
MEPC.2/Circ.12, *Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule-making process*, IMO-Marine Safety Committee, 2013		

	Teaching materials at Merlin e-learning platform.		
Optional literature (at the time of submission of study programme proposal)	1. Y. Y. Haimes, *Risk modeling, assessment, and management*, John Wiley & Sons, Inc, New Jersey, 2009. 2. T. Aven, *Quantitative Risk Assessment*, Cambridge University Press, New York, 2011. 3. H. Dezfuli, D. Kelly, C. Smith, K. Vedros, W. Galyean, *Bayesian Inference for NASA Probabilistic Risk and Reliability Analysis*, NASA/SP-2009-569, 2009. 4. D. Vose, *Risk Analysis*, 3rd edition, John Wiley & Sons, Inc, New Jersey, 2008.		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">VIBRATIONS IN MARINE ENGINES</td></tr>
<tr><td>Code</td><td>-</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Nenad Vulić, PhD, full professor with tenure</td><td>Credits (ECTS)</td><td colspan="4">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Karlo Bratić, PhD</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the theoretical and empirical insights into technical areas associated with mechanical vibrations in marine engines and machinery.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">o No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">Student will be able to:
1. Solve problems by selecting and applying essential notions associated with vibrations, and by distinguishing various types of vibrations in mechanical systems.
2. Determine the specific frequency and response of the vibration system with one-stage motion freedom.
3. Determine the specific frequency and response of the vibration system with two-stage motion freedom.
4. Create a simple mechanical model for the marine propulsion system exposed to various vibrations, and perform its simulation using adequate software, e.g. Excel, VBA, SimulationX, etc.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to vibration systems.
2. Types of vibrations.
3. Harmonic and periodic motion. Fourier's order.
4. Elements of a vibration system: mass, spring, damper.
5. Analysis of vibrations.
6. Vibration system with one-stage motion freedom.
7. Axial vibrations: free damped vibrations and free undamped vibrations.
8. Forced damped vibrations.
9. Torsion vibrations: free damped vibrations. Forced damped vibrations.
10. Vibration system with two-stage motion freedom.
11. Axial vibrations: free undamped vibrations. Forced damped vibrations.
12. Torsion vibrations.
13. Vibrations of the bending systems with one-stage or two-stage motion freedom.
14. Critical speeds in shafts.
15. Vibrations in the marine propulsion system (torsion, axial, bending and precession).
Exercises:
1-15. Solving simple examples in order to illustrate individual topics, familiarise with software tools and prepare for an independent creation of the seminar assignment.</td></tr>
<tr><td></td><td colspan="3">☒ lectures</td><td colspan="3">☐ independent assignments</td></tr>
</table>

<table>
<tr><td>Format of instruction</td><td colspan="2">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="4">☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. In case of justified absence, the students whose attendance in lectures and/or exercise amounts to 70% or more can compensate for absence from the class through consultation hours and/or making seminar papers until the required attendance criteria are met. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam by creating and presenting a seminar paper.
Students are assigned tasks to be carried out through individual or team work, using the e-learning material.
Students who have fulfilled other course obligations but have not completed the seminar paper have to register for the final exam in the examination period.
The student who has passed all the midterm exams is expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade.
Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.75</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>3.25</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Active participation in class is encouraged and monitored throughout the semester. The exam can be passed by creating and presenting a seminar paper at the end of the semester.
Students who have fulfilled other course obligations but have failed to produce a seminar paper, have to complete the seminar paper and take the final oral exam. The final grade comprises the class attendance and the evaluation of the seminar paper and its presentation.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>18.75</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>81.25</td></tr>
</table>

Grading

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
</table>
</td></tr>
</table>

	0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
	50-64	Performance meets the minimum criteria	Sufficient (2)
	65-79	Generally sound work, with a number of notable errors	Good (3)
	80-89	Performance above the average standard, with some errors	Very good (4)
	90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	R. Grubišić: *Teorija konstrukcija - primjeri dinamičke analize elemenata konstrukcije*, Fakultet strojarstva i brodogradnje, Zagreb, 2002.		
	N. Hadžić, S. Rudan, J. Parunov, R. Grubišić: *Zbirka zadataka iz statičke i dinamičke analize brodskih konstrukcija,* Fakultet strojarstva i brodogradnje, Zagreb, 2016.		
	B. H. Tongue: *Principles of Vibration* (2nd edition), Oxford University Press, New York, 2002.		
	H. Dresig, F. Holzweißig: *Dynamics of Machinery - Theory and Applications (translation of the 9th edition),* Springer-Verlag, Berlin, Heidelberg, 2010.		

Optional literature (at the time of submission of study programme proposal)	1. S. S. RAO: *Mechanical Vibrations,* 5th edition, Pearson Education, Inc., Prentice Hall, Upper Saddle River, 2011. 2. ISO/TR 19201:2013, *Mechanical vibration - Methodology for selecting appropriate machinery vibration standard*, International Organisation for Standardisation, Geneva, 2013. 3. ISO 20283-4:2012 +A1:2014, *Mechanical vibration - Measurement of vibration on ships - Part 4: Measurement and evaluation of vibration of the ship propulsion machinery,* International Organisation for Standardisation, Geneva, 2014. 4. ISO 3046-5:2001, *Reciprocating internal combustion engines - Performance - Part 5: Torsional vibration,* International Organisation for Standardisation, Geneva, 2014. 5. VDI 3843-1:2018-02, *Modelling of vibrating systems,* Verein Deutscher Ingenieure e.V., Düsseldorf, 2018. 6. VDI 2039:2016-06, Corr. 2016-08, *Torsional vibration of drivelines - Calculation, measurement, reduction,* Verein Deutscher Ingenieure e.V., Düsseldorf, 2016.
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">MARINE ENGINE CONTROL</td></tr>
<tr><td>Code</td><td>PFS216</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Gojmir Radica, PhD, full professor
Branko Lalić, PhD</td><td>Credits (ECTS)</td><td colspan="4">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Tino Sumić, MEng</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4">10%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the basic principles of the artificial intelligence and expert systems, and their application in marine engines. Determine the principles of operation, use and ways to control marine engines. Compare the intelligent marine engines and their control systems in various manufacturers. Analysis of the expert systems for maintaining marine engines.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Establish relevant parameters to determine the condition of a marine engine.
2. Compare the operation features of the intelligent marine engines.
3. Assess the new technologies applied into marine engine systems.
4. Critically evaluate the expert systems for the diagnostics and control of intelligent marine engines.
5. Recommend improvements to the systems of controlling and maintaining marine engines.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. General notions on artificial intelligence.
2. Features of the modern marine internal combustion engines.
3. Overview of the control systems of the modern marine engines.
4. Advantages of the intelligent systems and principle of the intelligent engine.
5. New technologies in fuel systems.
6. New technologies in lubricating systems.
7. New technologies in cooling systems.
8. New technologies in exhaust gas and fresh air supply systems.
9. Fuel injection and combustion in diesel engines.
10. Control and supervision of the intelligent engines.
11. Analyses of working processes in the engine.
12. Expert systems for diagnostics in intelligent engines.
13. Numerical simulations and their application.
14. Quality requirements of the working media and exhaust emission requirements.
15. Possibilities to enhance the systems of controlling and maintaining marine engines.
Exercises:
1. Examples of the artificial intelligence application.
2. Examples of the intelligent internal combustion engines.
3. Comparison of parameters in the engines featuring various technologies.
4. Examples of advanced technological solutions in marine engines.
5. Examples of advanced technological solutions in marine engines.
6. Examples of advanced technological solutions in marine engines.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">7. Elaboration of new fuel injection technologies.
8. Elaboration of new lubricating and cooling technologies.
9. Elaboration of the combustion process.
10. Examples of the numerical analyses of working processes.
11. Elaboration of the intelligent engines produced by MAN and Wartsila.
12. Elaboration of the intelligent engines produced by MAK, Caterpillar, MTU.
13. Examples of testing the intelligent two-stroke marine engines.
14. Examples of testing the intelligent four-stroke marine engines.
15. Consideration of IMO rules and requirements, and their effects on the future development of engines.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:
Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in lectures, auditory and laboratory exercises, in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Obligations of part-time students:
Minimum attendance for part-time students is 50% in lectures and seminars. During the semester, students have to perform independent assignments, make and present seminar papers in line with the teacher's guidelines.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Mid-term tests</td><td>2.875</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:
There are 2 midterm exams in the semester. The first is held in the 7th week, while the second midterm test, comprising theoretical questions, takes place in the 15th week of the semester. Sample tests and exam questions are available online at Merlin e-learning platform. A student has to achieve at least 50% of the points to pass a midterm exam. In case of passing both midterm tests, the student does not have to take the final written test in the examination period.
The final grade comprises the class attendance and results of the midterm tests.
Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>28.2</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>35.9</td></tr>
</table></td></tr>
</table>

	2nd midterm test	50	35.9

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

In case a student has fulfilled his/her duties but has failed the midterm tests, he/she has to take the final written tests in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
G. Radica: *Inteligentni brodski motori*, script, Faculty of Maritime Studies in Split, 2011.		
G. Radica: *Expert system for diagnosis and optimisation of marine diesel engines*, Strojarstvo, Zagreb.		
Z. Jurić, G. Radica, N. Račić: *Ekspertni sustav inteligentnog dizelskog motora*, Naše more, Dubrovnik. 2005.		

Optional literature (at the time of submission of study programme proposal)

1. MAN B&W Technical paper: The Intelligent Engine: Development Status and Prospects
2. D. Woodyard: Pounders marine diesel engines and gas turbines, 2009, Elsevier
3. www.AAAI.org
4. http://www.dieselnet.com/tech/plasma.html
5. The Intelligent Engine: Development Status and Prospects; http://www.mandieselturbo.com/files/news/filesof769/Int%20Eng%20Prospects.pdf
6. ME Control System; http://download.odessacrewing.com/test/MAGIC%20FINISH%20PLAN/MAN-BW%20Files/0603%20ME%20Control%20System.pdf
7. ME Engines-the New Generation of Diesel Engines; http://www.mandiesel.com/files/news/filesof2810/p412-0503.pdf
8. DU WÄRTSILÄ RT-flex Engine; http://www.ihi.co.jp/du/skills/data/du_sulzer_rt_flex_english.pdf
9. Wärtsilä RT-flex common-rail engine Statistics; http://www.infomarine.gr/downloads/manufactures/Wartsila-RT-flex_statistics_Oct2009.pdf
10. The Sulzer RT-flex Common-Rail System Described; http://cmapspublic2.ihmc.us/rid=1159369460928_1571362083_813/rtflex_description_02.pdf

Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MARINE REFRIGERATING AND AIR-CONDITIONING SYSTEMS</td></tr>
<tr><td>Code</td><td>PFS212</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Zdeslav Jurić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">/</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Acquiring advanced knowledge of the cooling systems, their operation principles, application on board, precaution and environmental preservation. Dimensioning a marine refrigerating system and its components. Familiarisation with cooling fluids, their impact on the environment. Calculation of ventilation, natural and forced. Calculation of the marine air-conditioning systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Analyse and design the classification diagrams of the marine refrigerating and air-conditioning systems.
2. Assess the energy efficiency of the marine refrigerating and air-conditioning systems and take adequate measures for increasing the efficiency.
3. Analyse the mutual interdependence of the values within the system and the cause-effect relation of these values. Use the results when making decisions.
4. Select the most suitable option for maintaining the marine refrigerating and air-conditioning systems.
5. Control the marine refrigerating and air-conditioning systems under complex and variable conditions. Successful control performance under unpredictable conditions and effects of the results of these tasks.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures and exercises:

1. Introduction and definitions. Ways of cooling the refrigerating chambers. Insulation materials.
2. Refrigeration processes and classification of the cooling engines and devices. Measures aimed at increasing the cooling efficiency.
3. Cooling fluids (properties, application area, handling, health risk, environmental impact). Elements of the compressor refrigerating plant.
4. Regulation of the compressor capacity. Essential calculation of the reciprocating cooling compressor.
5. Condensers. Heat calculation. Liquid coolant manifold. Heat exchangers. Evaporators (calculation).
6. Determining the basic values of the steam compressor refrigerating devices.
7. Temperature regulation in the refrigerating engines and devices. Automation and basic elements within marine refrigerating engines and devices. Remote control.
8. Heat pumps and using refrigerating devices as heat pumps. Testing of marine refrigerating engines and devices.
9. Meteorological, climate and hygienic impacts on heating, ventilation and air-conditioning. Ventilation on board vessels. Air distribution.
10. Control of ventilation devices in the ventilation and air-conditioning systems. Necessity for drying air on board. Rotation devices for air drying.
11. Air-conditioning on board, in line with the standards of the Croatian Register of Shipping. Mechanical, heat (humidity) and physical (chemical) processing of the air.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">12. Basic air-conditioning systems on board – illustration of the operation during the summer and winter periods in h, x – diagrams.
13. Fundamentals of the calculation of an air-conditioning system.
14. Regulation systems within an air-conditioning plant (enthalpy, entropy and heat, static pressure, relative humidity).
15. Heat and medium recovery in the marine refrigerating and air-conditioning systems.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits.
At the beginning of the semester, each student is assigned a report to be created and presented in class, according to the teacher's guidelines. The report is considered successful when the student performs its clear and accurate presentation. Students have fulfilled their course obligations upon meeting attendance requirements and presenting the assigned report.
Students with insufficient attendance and/or poor report performance have to re-register the course in the following academic year.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. Other obligations are equal to those of regular full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td>0.375</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

The final grade comprises the class attendance, creation and presentation of the report, and results of the midterm tests / final exam. Students have to meet the minimum criteria of all these components in order to take the exam.
Students' activity in class is assessed over the semester. During the semester, students are continuously assessed through two midterm tests, after the 8th and 15th week of the semester. In case a student passes all midterm tests, he/she does not have to take the final exam. If a student has missed / failed one of the midterm tests, he/she can re-take that test in the first examination period. If a student has missed or failed the midterm test(s), he/she has to take the complete final exam.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>28.125</td></tr>
</table></td></tr>
</table>

	Report	100	9.375
	Seminar paper	100	12.5
	Midterm test 1	50	25
	Midterm test 2	50	25

Grading

Points (%)	Criterion	Grade
0 – 49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50 – 64	Performance meets the minimum criteria	Sufficient (2)
65 – 79	Generally sound work, with a number of notable errors	Good (3)
80 – 94	Performance above the average standard, with some errors	Very good (4)
95 – 100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures. Their mandatory obligations include the creation and presentation of the assigned report. The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Martinović, D.: *Brodski rashladni uređaji*, Školska knjiga, Zagreb, 1994.		

Optional literature (at the time of submission of study programme proposal)	1. O. Fabris: *Hlađenje i klimatizacija*, Energetika MARKETING d.o.o., 2023. 2. Ozretić, V.: *Brodski pomoćni strojevi i uređaji*, Ship management, Split, 1996. 3. B. Pavković. A. Božunović: *Tehnika hlađenja*, Tehnički fakultet, Sveučilište u Rijeci (on-line edition).
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="5">MATERIALS FOR MARINE APPLICATIONS</th></tr>
<tr><td>Code</td><td></td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Liane Roldo, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">/</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4">/</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">The purpose of the course is to expand, update, explain in more detail and consolidate important topics discussed in other courses. Furthermore, to explain and show with various examples the relationship between constructions and properties of materials and production processes, behaviour in application and effects on the environment. Conceptualization and application of polymer, ceramic and glass materials on vessels.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Distinguish the properties of individual materials.
2. Explain the material specifications (technical lists) and use them.
3. Use the necessary material according to its application.
4. Master the basics of 3D prototyping techniques and strengthen welding skills.
5. Participate in discussion, describe the details about technical issues in marine engineering.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to “Materials for Marine Applications").
2. General aspects of materials properties: physical and chemical properties).
3. General aspects of materials properties: mechanical properties).
4. 3D prototyping techniques.
5. Rapid prototyping. 3D printing.
6. Additive manufacturing 3D printing.
7. Definitions of polymers and composites, types of polymers and composites for marine applications.
8. Polymer production processes, applications for marine use.
9. Ceramics and glass for marine applications.
10. MIDTERM EXAM 1.
11. Fusion welding.
12. Solid-state welding.
13. Marine engineering case studies related to materials and their application.
14. Marine engineering case studies related to materials and their application.
15. MIDTERM EXAM 2.
Exercise:
During exercise, the students will be divided into groups of 2 to 3 members.
1 hour – Selection of groups and practical tasks.
2 hours – Preparing the projects for 3D printing.
7 hours – Practical work: 3D printing.
During practical exercise, the students should: (1) familiarize with the equipment; (2) select material for the available equipment; (3) study the standards; (4) determine the geometry, dimensions and number of samples for 3D printing; (5) perform/participate in the printing process; (6) visually analyse the produced samples and compare them with the previous works performed with the aid of the same equipment.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">1 hour – Final consultations (after 2nd Midterm exam).
4 hours – Seminars and presentations.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☒ seminar paper</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time and part-time students:

Records of student attendance are kept as attending classes is compulsory. In order to take the exam and earn ECTS credits, full-time students are required to attend at least 80% of lectures while part-time students are required to attend at least 50% of lectures. All students have to attend 100% of exercise (practical training) and 100% of field work. Students with insufficient attendance cannot apply for the exam and have to re-register the course in the following academic year.

Students can earn their grade through continuous assessment by passing two midterm exams. A student has to achieve at least 50% of points to pass each midterm exam. In case a student has fulfilled all course obligations but has failed / missed the midterm tests, he/she has to take the final written test in the examination period.

It is mandatory that students attend 100% of exercise hours (practical training) and complete the seminar tasks (assigned to them at the beginning of the semester). A seminar task is considered as successfully completed if it earns at least 70% points. The seminar tasks are assessed separately. One seminar task (selected by the student group) requires a PowerPoint presentation at the end of the semester.

The final grade comprises the class attendance, results of the midterm tests / final exam, and the assessment of the individual / team tasks.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.875</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Full-time students are required to attend at least 80% of lectures, 100% of exercise (practical training) and 100% of field work.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Midterm test 1</td><td>50</td><td>40</td></tr>
<tr><td>Midterm test 2</td><td>50</td><td>40</td></tr>
<tr><td>Seminar paper</td><td>70</td><td>20</td></tr>
</table>
Grading

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0 – 49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>50 – 64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65 – 79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80 – 89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90 – 100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Grading and continuous assessment of part-time students:
Part-time students are required to attend at least 50% of lectures, 100% of exercise (practical training) and 100% of field work. The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>W. D. Callister, Jr., D. G. Rethwisch. Materials Science and Engineering – an Introduction, John Wiley & Sons, Inc., 2018.</td><td></td><td></td></tr>
<tr><td>James F. Shackelford. Introduction to Materials Science for Engineers. 2015.</td><td></td><td></td></tr>
<tr><td>M. P. Groover. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, John Wiley & Sons, Inc., 2019.</td><td></td><td></td></tr>
<tr><td>M. F. Ashby. Materials Selection in Mechanical Design, 3rd ed., 2004.</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>

C. A. Harper. Handbook of Plastics, Elastomers, and Composites. McGrawHill, 4th ed., 2002.
Z. Kulenović, N. Vulić. Elementi brodskih strojeva i pomorskih konstrukcija. University of Split – Faculty of Maritime Studies, Split, 2020.
Gabrić, S. Šitić. Materijali I. University of Split, Split, 2012.
Gabrić, S. Šitić. Materijali II. University of Split, Split, 2015.
Duplančić, N. Krnić. Materijali 3, zavod za strojarsku tehnologiju. University of Split – Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2009.
J. S. Reed. Principles of Ceramic Processing, John Wiley & Sons, 2nd ed., 1995.
ASM Handbook, Properties and Selection: Irons, Steels and High Performance Alloys, vol. 1, 10th Edition, USA, 1990.
ASM Handbook, Properties and Selection: Nonferrous Alloys and Special-Purpose Materials, vol. 2, 10th Ed., USA, 1990.
ASM Handbook, Metallography and Microstructures. vol. 9, 1990
ASM Handbook, Heat Treating, vol. 4, 1990.
ASM Handbook, Alloy Phase Diagram, vol. 3, 1990.
ASM Handbook: Materials Selection and Design. vol. 20, 1990.

</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td>In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.
Due to practical classes requirements, the courses are optimized for groups of maximum 18 students. Practical classes are held corresponding to the work time-table of the teacher and/or the assistant in charge of the laboratory.</td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">QUALITY MANAGEMENT IN SHIPPING</td></tr>
<tr><td>Code</td><td>PFN209</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Helena Ukić Boljat, PhD</td><td>Credits (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4">30%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Ability to understand quality systems and international standards. Development of strategy and process for establishing, maintaining and improving quality systems in maritime systems and processes.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">After successfully completing the course, the student will:
1. Recognize the professional and scientific principles and procedures relevant to the maritime profession for the purpose of establishing an integrated management system.
2. Apply methods and tools to improve process quality (emphasis is placed on maritime institutions / companies).
3. Implement appropriate techniques for continuous improvement of the quality management system.
4. Analyse the link between total quality management, sustainable development and social responsibility.
5. Interpret and evaluate international and national maritime safety systems, rescue elements, and manage maritime risks.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lectures:
1. Introductory notes on the teaching methods, learning outcomes, rules for writing and presenting seminar papers, grading, passing exams. Definition of quality and explanation of relevant terms from different points of view. Determine the quality perception of the product / service user.
2. Historical development of quality and current requirements. Quality gurus - Deming, Crosby, Feigenbaum, Ishikawa, Taguchi, Jurana - their importance in quality development.
3. Quality development and definition - statistical quality control and testing, quality assurance, quality management.
4. Total Quality Management – TQM. Concept, meaning and principles. Integrated quality management.
5. Quality Management: Six Sigma.
6. Development and application of ISO 9001 standards.
7. Process management. Quality policy. Documentation. Motivation. Guidance. Quality spiral. Process approach. Judgment. Management system implementation quality. Quality control. Quality marketing.
8. Introduction of a quality system. Quality system review. Internal and external audit. MIDTERM EXAM 1.
9. Quality management methods and tools. Implementation of quality management methods.
10. Quality management methods and tools. Implementation of quality management methods.
11. Quality management methods and tools – explain, interpret and recommend the implementation of quality management methods.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">12. Quality costs.
13. Integrated quality management systems. Environmental management systems, safety and health management systems. Food safety management systems, information security management systems. Energy management systems, social responsibility.
14. International Safety Management Code. Introduction of quality management system in maritime companies, institutions, maritime colleges: personalities, expectations, opportunities, difficulties, benefits. Good practice examples. Accreditation, certification and supervision.
15. Introduction of quality management system in maritime companies, institutions, maritime colleges: personalities, expectations, opportunities, difficulties, benefits. Good practice examples. Accreditation, certification and supervision. MIDTERM EXAM 2.

Exercises:

1. Budgets – exercises.
2. Budget - auditory exercises.
3. Budget - auditory exercises.
4. Assignment of seminar paper and instruction for drafting.
5. Application of statistical methods for quality assessment.
6. An example of good practice of quality management. Students visiting an organization (e.g. Port Authority).
7. An example of good practice of quality management. Visiting students an organization (e.g. Jadrolinija plc). Tailored to work environment visits.
8. Budget - auditory exercises.
9. An example of quality management application – Faculty of Maritime Studies in Split. Presentation of seminar papers.
10. An example of internal audit application – Faculty of Maritime Studies in Split. Presentation of seminar papers.
11. External audit example - Faculty of Maritime Studies in Split. Presentation of seminar papers.
12. Familiarization with the quality control tools. Presentation of seminar papers.
13. Creating a cause-effect diagram for an area that requires to be improved, e.g. safety of navigation. Presentation of seminar papers.
14. Creating a quality control list, e.g. marina services. Presentation of seminar papers.
15. Risk assessment. Presentation of seminar papers.</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td>☒ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:

Records of student attendance are kept (Form F04) as attending lectures and exercises is compulsory. A full-time student is required to attend at least 80% of class attendance (lectures and auditory exercises) and 100% of practical work (laboratory exercises) in order to take the exam and earn ECTS credits. Students with insufficient attendance cannot apply for the exam and have to re-register the course in the following academic year.

Obligations of part-time students:

A part-time student is required to attend at least 50% of class attendance (lectures and auditory exercises) and 100% of practical work (laboratory exercises) in order to take the exam and earn ECTS credits. Students with insufficient attendance</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">cannot apply for the exam and have to re-register the course in the following academic year.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td>1</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td>0.25</td><td>Home work</td><td>0.375</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Auditory exercises</td><td>0.375</td></tr>
<tr><td>Tests</td><td>1.875</td><td>Oral exam</td><td>(alternative)</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>(alternative)</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">
Assessment and grading of full-time students:

Students can meet the requirements for earning the final grade in two ways.
WAY 1 – Continuous assessment:
The final grade is achieved through continuous assessment, class attendance, creation and presentation of seminar papers and midterm test results. During the semester, the student creates and presents a seminar paper (30%), takes a midterm test on the practical tasks and calculations (30%) and takes a midterm test containing theoretical tasks / or takes an oral exam (30%).
The midterm test comprising practical tasks is held on a number of occasions throughout the semester.
Activity in class makes up to 10% of the final grade.

Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance and activity</td><td>80-100</td><td>10</td></tr>
<tr><td>Midterm test (tasks)</td><td>50-100</td><td>30</td></tr>
<tr><td>Seminar paper</td><td>50-100</td><td>30</td></tr>
<tr><td>Theoretical part</td><td>50-100</td><td>30</td></tr>
</table>
WAY 2 – Final exam:
If a student misses or fails to achieve the positive continuous assessment, he/she can take the final exam in the examination period. Completing a seminar paper is compulsory. The final exam consists of written and oral part. Students who pass the written test and have completed their seminar papers can take the oral test that is typically held up to 5 days after the written test. The final grade takes into account the class attendance, assessment of the student's previous performance, and results achieved on the final exam.

Final assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Written test (practical part)</td><td>50-100</td><td>40</td></tr>
<tr><td>Written and/or oral test (theory)</td><td>50-100</td><td>50</td></tr>
<tr><td>Previous performance</td><td>50-100</td><td>10</td></tr>
</table>
Grading
<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0 - 49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>50 - 61</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>62 - 74</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>75 - 87</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>88 - 100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures and auditory exercises, and 100% class attendance of practical work (laboratory exercises). The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>T. Lazibat: Upravljanje kvalitetom, Sinergija, Zagreb, 2009.</td><td>0</td><td>DA</td></tr>
<tr><td>M. Kuliš, D. Grubišić: Upravljanje kvalitetom, Ekonomski fakultet u Splitu, Split, 2010.</td><td>1</td><td></td></tr>
<tr><td>K. Buntak; T. Baković; P. Mišević; M. Damić; L. Buntić: Kvaliteta i sustavi upravljanja kvalitetom, University manual; Hrvatska gospodarska komora; Zagreb, 2021.</td><td>0</td><td>https://hgk.hr/documents/sveucilisni-prirucnik-kvaliteta-i-sustavi-upravljanja-kvalitetom618e70fc7168b.pdf</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>
1. Injac, N.: Mala enciklopedija kvalitete, I. dio - Upoznajmo normu ISO 9000,Oskar, Zagreb, 2002.
2. Injac, N.: Mala enciklopedija kvalitete, II. dio - Informacije; dokumentacija; auditi, Oskar, Zagreb, 2002.
3. Injac, N.: Mala enciklopedija kvalitete, III. dio - Moderna povijest kvalitete, Oskar, Zagreb, 2001.
4. Baković, T.; Dužević, I.; Lazibat, T.: Upravljanje kvalitetom, course book, University of Zagreb, Ekonomski fakultet, 2023.
</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">SCIENTIFIC RESEARCH METHODOLOGY</td></tr>
<tr><td>Code</td><td>PFP141</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Helena Ukić Boljat, PhD</td><td>Credits (ECTS)</td><td colspan="4">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">/</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>0</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4">10%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarise the students with the concept, methodology and technology of the scientific and professional research. Enable the students to perform simple research and to write and present their work.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Present a general definition of science, its essential features and classification.
2. Distinguish and classify the types and structures of the scientific and professional papers.
3. Plan and organise the scientific research technology.
4. Suggest and apply research methods.
5. Present the acquired skills in writing, technical processing and presentation of the work.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the course.
2. On science. Characteristics of the contemporary science.
3. Scientific and research activity.
4. Technology of the scientific research.
5. Identification of the scientific problem.
6. Setting a hypothesis.
7. Creating a research plan.
8. Composing the working bibliography. Collection, selection and study of the literature and scientific sources.
9. Research methodology.
10. Scientific methods.
11. Scientific methods.
12. Application of the scientific methods when creating a new scientific piece.
13. Scientific and professional work.
14. Organisation of the structure of the professional / scientific paper.
15. Writing and technical processing.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☒ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:
Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in</td></tr>
</table>

order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students are assigned tasks to be carried out throughout the semester. In addition, each student is assigned a seminar paper, to be created and presented according to the course teacher's guidelines.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. Throughout the semester, students have to carry out the assigned tasks and to create and present seminar papers, according to the course teacher's guidelines.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*

Class attendance	0.75	Research		Practical training	
Experimental work		Report		Independent assignments	1.25
Essay		Seminar essay	2	(Other)	
Tests		Oral exam		(Other)	
Written exam		Project		(Other)	

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

Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The exam can be passed by creating a presenting a seminar paper, as an individual or team work, following the teacher's guidelines and meeting the agreed deadlines. The completed seminar paper makes up to 30% of the final grade.
Seminar papers have to be presented in class, according to the agreed schedule. The written and oral presentation of the seminar paper makes up to 60% of the final grade.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	10
Independent / team assignments	50	30
Seminar task	50	60

Students who have earned enough points (% of the performance) during the continuous assessment have to apply for the exam through the online student service (Studomat) in the first examination period. The grades entered in Studomat correspond to their overall performance.
Students who have fulfilled all course obligations but have failed or missed the midterm(s) have to register for the final exam in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)

<table>
<tr><td></td><td>
<table>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>1. Stephen S. Carey, A Beginner's Guide to Scientific Method, 4th Edition, Wadsworth, Cengage Learning, USA, 2012.</td><td></td><td>Yes</td></tr>
<tr><td>2. Kumar R., Research Methodology a step-by-step guide for beginners, SAGE Publications Ltd, 2011.</td><td></td><td>Yes</td></tr>
<tr><td>3. Zelenika R., Metodologija i tehnologija izrade znanstvenog i stručnog djela, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka, 2000.</td><td>5</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>1. Kulenović Z., Metodologija istraživačkog rada, University of Split – Faculty of Maritime Studies, Split, 2005.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MARITIME SCIENCE</td></tr>
<tr><td>Code</td><td>PFP140</td><td colspan="2">Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Tina Perić, PhD, associate professor</td><td colspan="2">Credits (ECTS)</td><td colspan="4">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">/</td><td colspan="2" rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>0</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td colspan="2">Percentage of application of e-learning</td><td colspan="4">/</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Familiarise the students with the maritime shipping as a scientific area, and with the classification and specific features of this multi-disciplinary science. Introduction to the specific nature of maritime economic and non-economic activities.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1. Classify and interpret the maritime systems.
2. Describe and analyse the maritime systems.
3. Analyse the technical, technological, legal, economic, social, biological and ecological aspects of the maritime systems.
4. Evaluate the international aspects of the maritime shipping and the impact of the EU on the development of maritime affairs.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Lectures:
1. Introduction to the course. Development and major discoveries in the area of maritime merchant and naval shipping.
2. Systems of seafarers' education in Croatia and abroad.
3. Maritime affairs and maritime economy – essential notions.
4. Maritime sub-systems.
5. Sea-borne shipping: historical development and current situation.
6. Croatian shippers.
7. Coastal liner passenger shipping.
8. Croatia's passenger ship operators, agency for coastal liner passenger transport.
9. Seaports and their role on shipping routes.
10. Croatia's seaports.
11. Shipbuilding and boatbuilding.
12. Croatia's shipbuilding and its impacts across the world.
13. Development of nautical and tourism activities.
14. Scientific disciplines affecting the growth of maritime activities, and scientific methods applied in maritime affairs (social, biomedical, biotechnical science, and the like).
15. Scientific disciplines affecting the growth of maritime activities, and scientific methods applied in maritime affairs (natural science, technical science, etc.).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="4">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="7">Obligations of full-time students:</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam by taking 2 midterm tests during the semester. Taking midterms is a duty.
Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final exam in the examination period.
The student who has passed all the midterm exams is expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade in his/her record book. Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.75</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2.25</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">
Assessment and grading of full-time students:

Class attendance (minimum 80%, i.e. 12 weeks) and active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. There are two (2) midterm exams in the semester. The first comprises Lectures 1-4 and is held in the 5th week, while the second midterm test comprises Lectures 5-10 and is held in the 14th week of the semester. A student has to achieve at least 50% of the points to pass a midterm exam. Students who fail or miss a midterm exam for justified reasons can re-take the test.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>25.0</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>37.5</td></tr>
<tr><td>2nd midterm test</td><td>50</td><td>37.5</td></tr>
</table>

Students who have fulfilled all course obligations but have failed or missed the midterm(s) have to register for the final exam in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Grading

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>Dundović, Č.: Pomorski sustav i pomorska politika, University of Rijeka – Faculty of Maritime Studies, Rijeka, 2003.</td><td></td><td>Yes</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>1. Mrnjavac, E.: Pomorski sustav, University of Rijeka – Faculty of Maritime Studies, Rijeka, 1998.
2. Pomorska enciklopedija, L. Z. Miroslav Krleža, Zagreb, 1972-1989.
3. Encyclopaedia of Ocean Sciences, Academic Press, 2001.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MAINTENANCE MANAGEMENT II</td></tr>
<tr><td>Code</td><td>PFS214</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Luka Mihanović, PhD, full professor
Ladislav Stazić, PhD</td><td>Credits (ECTS)</td><td colspan="5">7</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">This course resumes the matter and issues addressed in the course "Maintenance management 1" and comprises the methodology for the implementation of the maintenance program on board with regard to the types and timing of overhauls, for the purpose of meeting the requirements of the standards and statutory regulations of the classification societies. The goal of the course is to familiarise students with the development and implementation of the preventive maintenance plan that complies with the requirements of the classification societies, with the special focus on the dry-docking and overhaul of the vessel, including planning, preparation of DD specification, tenders, preparation of the vessel for overhauling, monitoring and supervision of activities until the end of the procedure.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Define and explain the technology and organisation of the ship maintenance, including the access to maintaining the ship’s systems and devices.
2. Define and explain the modern approach to maintenance, explain the importance and apply diagnostic tools in the maintenance.
3. Explain the importance of the maintenance over the ship’s life-span.
4. Evaluate and classify the causes of errors in ship maintenance.
5. Determine the methods of anticipating human errors in ship maintenance and fault tree analysis (FTA) methods of identifying the possible causes of a system failure.
6. Anticipate necessary supplies and spares for ship maintenance.
7. Evaluate the methodologies of the vessel’s preparation for dry-docking.
8. Distinguish the dry-docking specifications.
9. Manage the system of the planned maintenance on board and in company.
10. Anticipate the overhaul and supervision during dry-docking. Plan and perform inspection tasks associated with dry-docking.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Elements of preventive maintenance. Principles of the Machinery Planned Maintenance Systems (MPMS). Development and implementation of the ship maintenance, RCM approach.
2. Planned maintenance of the vessel’s machinery system. The role of the chief engineer and the classification society. Methods of inspecting the state, operation characteristics, physical measurements, visual examination, vibrations, oil and fuel analysis.
3. Types and timings of the overhauls. Alternative examinations of the hull. Gradual, PMS (Planned Maintenance System), inspection program for the vessels carrying the mark ESP, CSR. Alternative inspections of the machinery. Basic examination of the newly acquired maritime objects.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">4. Control of supplies and spares during maintenance. Model for the economical management of orders. Safety spares. Model for estimating the quantity of spare parts.
5. Errors in maintenance over the vessel's life-span. Prevailing human errors, frequency and effects.
6. Causes of maintenance errors. Guidelines for reducing human errors in maintenance tasks. Methods of anticipating human errors in ship maintenance and fault tree analysis (FTA) methods of identifying the possible causes of a system failure.
7. Dry-docking of vessels. Types and periods of docking (regular, extraordinary, IWS, extended docking interval of 7.5 years). Requirements of the shipping register and classification societies. Measurement of the thickness of structural elements in line with the requirements of the classification societies.
8. Planning the docking (crew, shipowner). Creation of the dry-docking specification. Role of superintendents and crew tasks.
9. Preparation for docking: crew, tools, spare parts, administration procedures, dynamics, reporting. Creating and following the workflow of operations during dry-docking.
10. Safety preparations for dry-docking (fire-fighting, tank inerting, safety checks).
11. Inspection and maintenance of the underwater part of the hull.
12. Anti-corrosion protection of the hull, rudder, propeller, shafting, sterntube bearings, thrusters, anchor and anchor lines.
13. Inspection and maintenance of the boilers. Testing.
14. Cargo handling gear, annual overhaul, 5-year overhaul. Inspection of coamings, hatch covers and holds.
15. Test-run after docking.

Exercises:

1. Creating the computer configuration for the ship's maintenance system – examples in AMOS (Analysis of Moment Structures) system.
2. Dry-docking planning.
3. Creation of DD specifications.
4. Preparing the vessel for docking, overhaul and reporting.
5. Preparing the administration tasks.
6. Safety preparations for dry-docking a vessel (fire-fighting, tank inerting).
7. Safety checks during the overhaul.
8. Measuring the thickness and state of the ship's structural elements.
9. Preparing and performing the project assignment. (6 class hours)</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td>☐ independent assignments
☐ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits.
Insufficient attendance (excused absence up to 20%) has to be compensated by performing additional tasks, i.e. seminar paper. Students who have missed classes due to illness must have a valid medical document proving their health issues.</td></tr>
</table>

<table>
<tr><td></td><td>Students who have achieved less than 50% of class attendance cannot apply for the exam and have to re-register the course in the following academic year.
Students can pass the exam by taking 2 midterm tests and performing 1 program assignment during the semester. Taking midterms is compulsory.
Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final exam in the examination period.
The student who has passed the midterm exams and has performed the project assignment is expected to apply for the exam through the on-line service (“Studomat”) in the first examination period to obtain the grade in his/her record book. Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. Part-time students have to attend at least 80% of exercises. Students who have missed classes due to illness must have a valid medical document proving their health issues. Those with insufficient attendance cannot apply for the exam and have to re-register the course in the following academic year.</td></tr>
<tr><td>Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>
<table>
<tr><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Exercises</td><td>0.375</td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>2.625</td><td>(Other)</td><td></td></tr>
</table>
</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td>Assessment and grading of full-time students:

Project assignments are distributed to the students, to be carried out individually or in a group, following the guidelines and instructions of the advisor / teacher.
There are 2 written midterm exams in the semester. The first comprises Lectures 1-8 and is held in the 8th week, while the second midterm test comprises Lectures 8-15 and is held in the 15th week of the semester. Sample tests and exam questions are available on Merlin e-learning platform. A student has to achieve at least 50% of points to pass a midterm exam. Students who fail or miss a midterm exam for justified reasons, can re-take the test during the first examination period.
Students who have passed both midterms do not have to take the final exam, but they still have to complete their project assignments.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance, results of the midterm tests / final exam, and the assessment of the project assignment.

Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80%</td><td>21.4</td></tr>
<tr><td>Laboratory exercise attendance</td><td>80%</td><td>5.4</td></tr>
<tr><td>Project assignment</td><td>100%</td><td>37.6</td></tr>
<tr><td>Midterm test I</td><td>50%</td><td>17.8</td></tr>
<tr><td>Midterm test II</td><td>50%</td><td>17.8</td></tr>
</table>
</td></tr>
</table>

Students who have fulfilled all course obligations but have failed or missed the midterm(s) have to register for the final exam in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Grading

Points (%)	Criterion	Grade
0 - 49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50 - 61	Performance meets the minimum criteria	Sufficient (2)
62 - 74	Generally sound work, with a number of notable errors	Good (3)
75 - 87	Performance above the average standard, with some errors	Very good (4)
88 - 100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:

The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
Pravila za statutarnu certifikaciju pomorskih brodova, *Dio 1 – Opći propisi*, Croatian Register of Shipping / Hrvatski registar brodova, Split, 2013.		Yes
Rules for the Classification of Sea-Going Ships, Part 1 – General Requirements, Croatian Register of Shipping, Split, 2013.		Yes

Optional literature (at the time of submission of study programme proposal)

1. Lectures of the course teacher (available online at Merlin e-learning platform).
2. *IACS Unified Requirements*, www.iacs.org.uk
3. Lovrić: *Osnove brodske terotehnologije*, Faculty of Maritime Studies, Dubrovnik, 1989.
4. Šegulja, Bukša, Tomas: *Održavanje brodskih sustava*, Faculty of Maritime Studies, Rijeka, 2009.

Quality assurance methods that ensure the acquisition of exit competences

Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).

Other (as the proposer wishes to add)

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">SHIP STRUCTURAL MECHANICS</td></tr>
<tr><td>Code</td><td>PFS107</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Francisko Lukša, PhD</td><td>Credits (ECTS)</td><td colspan="4">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Karlo Bratić, PhD</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4">20%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Acquiring in-depth insights into linear mechanics of constructions, in particular the methods of analysing stress and deformations at static and dynamic load on marine engine construction elements and other core structures in marine objects. Familiarisation with stress and deformation of these constructions is a prerequisite for further research in the area of marine energy and engine systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Select project parameters by analysing stress and deformations of the elements of marine energy and engine systems at their static and dynamic loads.
2. Anticipate the solution to the practical problem by applying the acquired linear theory methods.
3. Provide consistent arguments and conclusions when discussing problem solution.
4. Recommend appropriate methods of analysing stress and deformation in specific situations.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction – basic notions.
2. Fundamentals of the theory of elasticity. Methods of solving problems in the area of the theory of elasticity. Stress and deformation. Hooke’s law. The state of plane stressing. The state of plane strain.
3. Energy methods. Energy of deformation. Clapeyron's theorem. Energy of the rod / pole deformation: axial load, shear load, torsion, bending. General case of loading.
4. Energy theorems. Generalized forces and generalized shifts. Betti's theorem. Maxwell’s theorem. Castigliano’s theorems.
5. Analysis of rod / pole constructions. Castigliano’s method. Mohr’s method. Vereščagin’s method. Example of the application of the Castigliano’s method for determining the shift of a statically determined girder.
6. Statically indeterminate constructions. External and internal statical uncertainty. Symmetric and antimetric load. Reactions of the relations of the statically non-defined constructions. Method of forces. Theorem of the minimum deformation energy. Examples of the application of the 2nd Castigliano’s theorem for determining the support reaction in a statically indeterminate system.
7. MID-TERM 1 – theoretical part.
8. Dynamic loads. Quasi-static, impact and variable loads. Examples. Changeable (dynamic) loads: types, values and cases of dynamic loads. Examples. Dynamic stresses: types. Symmetric and asymmetric stress cycles.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">9. Dynamic strength of materials. Strength in case of dynamic stresses. Fatigue. Initiation and development of the crack. Wöhler's curve. Material service-life curve. Accumulation of the fatigue damage. Smith's diagram. Haigh's diagram.
10. Dynamic strength of the construction elements. Factors affecting the dynamic strength. Dynamic strength of a real construction element. Dynamic safety and the consequences of the component failure.
11. Thick wall vessels. Differential equation of the element balance. Geometric analysis and application of Hooke's law. Thick wall vessels and pipelines. Thick wall vessels under internal / external pressure. Calculation of the strength of a thick wall vessel.
12. Rotating discs: the full disc and the disc with an orifice in the middle.
13. Bending of thin discs. Plane constructions. Thin discs – assumptions and limits. Analysis of deformation. Analysis of stress. Internal forces within a disc. Differential equation of disc bending. Disc of uneven stiffness. Example of an evenly and continuously loaded thin disc.
14. Thin symmetric shells – geometric properties, assumptions and limits. Balance equation. Stresses and deformations of the spherical, cylindrical and toroidal shell.
15. MID-TERM 2 – theoretical part.
Exercise:
1. Introduction – basic notions.
2. Basic notions of the theory of elasticity. Stress and deformation.
3. Energy methods.
4. Energy theorems.
5. Analysis of rod constructions.
6. Statically indeterminate constructions.
7. MID-TERM 1 – numerical part (1st program assignment).
8. Dynamic loads.
9. Dynamic strength of materials.
10. Dynamic toughness of construction elements.
11. Thick wall vessels.
12. Rotating discs.
13. Bending of thin discs.
14. Thin symmetric shells.
15. MID-TERM 2 – numerical part (2nd program assignment).</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td>☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:
Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in lectures and 80% in exercises, in order to take the exam and earn ECTS credits. In addition, they have to complete a program assignment, according to the course teacher's guidelines. Students with insufficient attendance cannot apply for the exam and have to re-register the course in the following academic year.
Obligations of part-time students:</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Their overall obligations cannot be less than 50% with regard to full-time students. Part-time students have to attend at least 50% of classes.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>E-learning</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Program assignment</td><td>1.5</td></tr>
<tr><td>Midterm tests</td><td>3</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">
Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. There are two (2) midterm exams in the semester. The first comprises Lectures 1-6 and is held in the 5th week, while the second midterm test comprises Lectures 7-12 and is held in the 14th week of the semester. Sample tests are available on Merlin e-learning platform. A student has to achieve at least 50% of the points to pass a midterm exam. Students who fail or miss a midterm exam for justified reasons can re-take the test in the 6th / 14th week of the semester.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance, the results of the midterm tests and individual / team assignments. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>0</td></tr>
<tr><td>Program assignment</td><td>50</td><td>20</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>40</td></tr>
<tr><td>2nd midterm test</td><td>50</td><td>40</td></tr>
</table>

Grading

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Grading and continuous assessment of part-time students:

Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the</td><td colspan="2">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
</table>

library and via other media)	Z. Kulenović: *Mehanika elemenata pomorskih konstrukcija*, Internal script, Faculty of Maritime Studies in Split, 2009.		
	I. Alfirević: *Nauka o čvrstoći II*, Golden marketing, Zagreb 1999.		
	J. Brnić, G. Turkalj: *Nauka o čvrstoći II*, Zigo, Rijeka 2006.		
Optional literature (at the time of submission of study programme proposal)	1. I. Alfirević: *Linearna analiza konstrukcija*, Faculty of Mechanical Engineering and Naval Architecture – University of Zagreb, 1999. 2. *Inženjerski priručnik IP1*, Školska knjiga, Zagreb, 1996. 3. Program MDSolids https://web.mst.edu/mdsolids/ 4. H. Goeldner H., et al.: *Lehrbuch Hoechere Festigheitslehre*, Physik-Verlag, Weinheim, 1985.		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="6">TECHNICAL SYSTEMS COMPUTER CONTROL</th></tr>
<tr><td>Code</td><td>PFE109</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Ivan Pavić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Luka Čulić</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">/</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the fundamentals of the management of technical systems and processes in the maritime industry with the help of computers. Introduction to the principles and integration of various maritime technical systems into a managed hierarchically organized computer system. SCADA.
STCW 7.03. Part of the matter contained in: 1.1.6. Ch. 6.1. (PLC, digital control systems, measurement, controllers, industrial sequence control); 1.1.7. Ch. 7.1. Competence 1.5. Ch. 1.5.1. 1.1., 1.5.2. Ch. 2.1.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Distinguish the basic elements of computer-controlled systems.
2. Compare various program codes for the same project and evaluate it appropriately.
3. Create code in a ladder diagram based on a given problem.
4. To argue for differences in how computer systems operated in online and off-line modes.
5. Present the mode of operation of marine automatic systems from the diagrams.
6. Critically evaluate the hierarchical structure of a computerized management system.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the course. Basic notions of the systems and automation. Mathematical and simulation models. Parameters of the system. Categorisation of technical systems: continuous, discrete, hybrid. System management. Fast and slow processes. Measuring median, sensors and executive elements.
2. Essential control tasks. Control and functions in the open and closed loops. Basic requirements of the RSU processes. Abilities of the RSU. Off-line and on-line modes of the computer operating system and their essential differences. Hard real time (deterministic systems) and soft real time (non-deterministic systems). Examples of the response time. Steps in building an on-line system. Description of the structures of complex systems for managing processes (intelligent systems in traffic). Basic principles and circuit elements of the system. Circuit components of systems for computerized process management. An example of an online system. Intelligent transport systems. Recognition of signal types. Analogue input and output signals. Multiplexing, faults, A / D, D / A. Types of interface.
3. Analogue sensors, faults, A / D, D / A, multiplexing, conditioning and filtering the signals. S & H loop (ideal and real). A/D, D/A conversion. Interface for connecting the computer with external units. Digital sensors. Examples of multi-bit digital sensors (timer, incremental encoder, barcode reader, etc.). Analog signal processing on a digital computer. Linearization of the transfer characteristic. Filtering of analogue signals.</td></tr>
</table>

	4. Multiplexing. Principles of an analogue multiplexor operation. Multiplexing of signals from various types of sensors. Digital processing of the analogue signals: sampling sets. Sampling density. Quantization principle. Errors and accuracy of the real A/D converters. Zero error. Non-existing codes. Monotony of change. Wilkins procedure, successive approximation. 5. D/A converters and errors. Features determining the quality of D/A converters. Serial and parallel data transfer. Example of a standard interface. Examples of connecting the analogue sensor to the digital hardware. An example of connecting a computer with an LED screen. Single-chip microcontrollers, control and programming. 6. Implementation of the PI and PID algorithm in a microcomputer. Serial and parallel data transfer, UART. Errors in asynchronous data transfer. Synchronous data transfer. Data transfer analysis. Channel characteristics. Means of data transmission. Standard communication channels. Modulations. 7. Basic principles of building a process control system. Connecting standard units into a comprehensive system. Hierarchical organisation of the RU system. Function and organization of hierarchical levels of the management system. Examples of hierarchical management system. Factors affecting the RSU architecture. RSU architecture: centralized, distributed. Implementations of typical control loops with examples (distributed factory system, distributed production plant, control loops over a communication network, closed-loop control of a continuous dynamic system). A bus-oriented distributed computer system. Typical designs of the control loops. Industrial networks, fieldbus technology, CAN. Performance of control loops over the network. Closed-loop control of a continuous dynamic system. An example of a closed control loop over a network. 8. Defining the problem of the automatic control system synthesis. Stability of the regulation circle. Stability criteria in continuous and discrete systems. Quality indicators. 9. Quality indicators for the continuous and the discrete systems over a period of time. Specification of requirements using a model transfer function of a closed control loop. Quality indicators in a frequency range (complex variables). Requirements for managing the system in a fixed time. 10. Regulation deviations depending on the type of excitation. Sampling timing. Problem of measurement noise. Elements in signal processing and noise processing RSU synthesis. Structures of digital regulators. Basic requirements for RSU processes. IEC 61131-3 program languages. 11. General architecture of the programmable logic controller (PLC). Ladder diagram, function blocks. Comparison of PLCs, micro-controller, DSP, SPLD, CPLD, FPGA. DSP algorithms and architecture. Systems on a Programmable Chip SOPC. SPDL. CPLD. FPGA. Programmable logic controller (PLC), PLC architecture. Typical elements for pre-processing of measurement signals: bridges, amplifiers, I/O converters, etc. 12. Typical elements in the pre-processing of signals. Deflection bridges. Amplifiers. Review of Thevenin and Norton's findings. I/O converters. Noise and interference. Noise sources. Adjustment of control signals to executive elements. 13. Reduction of noise. Control signal forms. Feedback integration procedure. Conditional integration procedure. Adaptation of the control system to accept operator commands. Manual override. Block set of the professional module of the PID controller. 14. Ship automation processes. Handling the vessel and cargo, navigation, communication. Processes taking place in the main and auxiliary engines. Remote control of the main engine operation (BCS 200). Engine cooling system. Supervision of cargo (GL-90). Marine computer-supported system for fire alarm and fire fighting on board. Manoeuvring the ship along the

<table>
<tr><td></td><td colspan="6">course, steering. Simple autopilot with P and PID regulator. Complex autopilots. Adaptive digital autopilot ADG 3000 VT.
15. Hierarchical architecture of the distributed system on board ship. PROFIBUS network. Propulsion control system. Example of a yacht – NMEA 2000. System for controlling the generators. Ballast water system. Fire-fighting system. Marine integrated electronic system. SCADA system. Computer networks of large ships.

Exercises:

1. Introduction to PLC devices: Siemens PLC LOGO or Step7. Installation and networking. Hardware support.
2. Software support to PLC devices. Essential programming in LOGO or Step7. List of basic functions.
3. Software support to PLC devices.
4. Software support to PLC devices.
5. Software support to PLC devices.
6. Examples of PLC systems in maritime industry. PLC system for starting and protection of the induction motor.
7. Examples of PLC systems in maritime industry. PLC system for starting and protection of the induction motor.
8. Examples of PLC systems in maritime industry. PLC system for controlling the multi-speed induction motor.
9. Examples of PLC systems in maritime industry. PLC system for controlling the multi-speed induction motor.
10. Examples of PLC systems in maritime industry. Water pumps.
11. Examples of PLC systems in maritime industry. Water pumps.
12. PLC industrial door control system.
13. PLC industrial door control system.
14. HMI interface, multi-panels and operation panels.
15. SCADA system – system for program supervision and control. Examples of programming.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept (Form F04) as attending lectures and exercises is compulsory. In order to take the exam and earn ECTS credits, a full-time student is required to complete at least 80% of class attendance (if the topics are not included in STCW). In case of learning modules that are in line with the STCW Convention, a full-time student is required at least 95% of class attendance and 100% of practical work (laboratory exercises). In case of STCW topics, absence can be compensated by performing individual assignments (seminar papers) or by attending compensation class hours; other topics can be covered over consultation hours.
Students with insufficient attendance cannot take the exam and have to re-register the course in the following academic year.

Obligations of part-time students:

The same requirements apply for part-time and full-time students.</td></tr>
<tr><td>Screening student work (name the</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
</table>

proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)	Experimental work		Report		(Other)	
	Essay		Seminar essay	0.5	(Other)	
	Midterm tests	2.375	Oral exam		(Other)	
	Written exam		Project		(Other)	

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

Assessment and grading of full-time students:

There are 2 midterm exams in the semester. The first comprises Lectures 1-7 and is held in the 8th week, while the second midterm test comprises Lectures 8-15 and is held in the 15th week of the semester. Sample tests are available on Merlin e-learning platform. A student has to achieve at least 40% of points to pass a midterm exam. Students who fail or miss a midterm exam for justified reasons, can re-take the midterm test. In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period. During the semester, students are required to prepare (and present) a seminar paper, which is one of the components of the final grade.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	28.1
Seminar paper	50	12.5
Midterm test 1	40	19.8
Midterm test 2	40	19.8
Midterm test 3 (practical exercise)	50	19.8

Grading

Points (%)	Criterion	Grade
0 - 39	Performance does not meet the minimum criteria	Insufficient - fail (1)
40 - 64	Performance meets the minimum criteria	Sufficient (2)
65 - 79	Generally sound work, with a number of notable errors	Good (3)
80 - 89	Performance above the average standard, with some errors	Very good (4)
90 - 100	Outstanding performance	Excellent (5)

In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Grading and continuous assessment of part-time students:

The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	I. Petrović: *Računalno upravljanje tehničkim sustavima*, FER Zagreb, 2011.	0	WEB

	I. Vujović: *Računalno upravljanje tehničkim sustavima*, teaching material available at Merlin e-learning platform.	0	WEB
	D. Kezić, G. Smiljanić, I. Vilović: *Računalno upravljanje tehničkim sustavima*, Faculty of Maritime Studies in Split, 2007.	0	WEB
	Siemens LOGO, Siemens.	0	WEB
Optional literature (at the time of submission of study programme proposal)	1. W. Bolton: *Programmable logic controllers*, Bidlles Ltd., 2002. 2. F. EL-Hawary: *The Ocean Engineering Handbook*, CRC Press, 2001.		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MARINE POWER SYSTEMS</td></tr>
<tr><td>Code</td><td>PFS209</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Gojmir Radica, PhD, full professor
Ladislav Stazić, PhD</td><td>Credits (ECTS)</td><td colspan="5">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Critically assess marine power systems and compare their operation principles and features. Determine the optimal operating conditions of the marine power systems on board vessels.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">Having successfully completed this course, students will be able to:
1. Evaluate the processes taking place in the marine power systems;
2. Categorise the essential elements of the marine power system;
3. Assess the operation features of the power processes;
4. Determine the optimal operating conditions of the marine power systems on board vessels.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">1. Introduction: energy – sources, consumption and transformation.
2. Energy systems. Rational use of energy and environmental protection.
3. Laws of thermodynamics and thermotechnics.
4. Energy systems using steam as a working medium. Steam turbines.
5. Energy systems using gas as a working medium. Gas turbines.
6. Energy systems using internal combustion engines.
7. Compressors, pumps, ventilators.
8. Heaters and coolers.
9. Combined cycle. Co-generation.
10. Energy balance of specific systems.
11. Optimisation of the marine power system with regard to propulsion and other energy consumption. Efficiency of power generator sin shipbuilding.
12. Technical and technological development of the power factors on board vessels.
13. Optimum speed of a vessel. Reliability. Selecting the propulsion machinery with regard to energy cost.
14. Efficiency in sea-borne shipping and the environmental protection – rules and standards.
15. Energy saving and an analysis of investments into energy production.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:</td></tr>
</table>

<table>
<tr><td></td><td>Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.

Obligations of part-time students:

Part-time students are required at least 50% of class attendance in lectures, seminars and workshops. Students are assigned tasks to be carried out through individual or team work, using the e-learning material. In addition, students have to create and present a seminar paper, according to the course teacher's guidelines.</td></tr>
<tr><td>Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>
<table>
<tr><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>4</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table>
</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td>
Assessment and grading of full-time students:

There are two (2) midterm exams in the semester. The first is held in the 7th week, while the second midterm test, comprising theoretical questions, is held in the 15th week of the semester. Sample tests and exam questions are available on Merlin e-learning platform.
A student has to achieve at least 50% of the points to pass a midterm exam.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period. The final grade comprises the class attendance and results of the midterm tests. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.
Students who have passed all the midterm exams or who have passed the final examination, are expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade.

Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>25.0</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>15</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>30</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>30</td></tr>
</table>
Grading
<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>D. Woodyard: Pounder's Marine diesel engines and gas turbines, Elsevier, 2004
Standards and rules: ISO 500001, EEDI, SEEMP</td><td></td><td>Yes</td></tr>
<tr><td>S. S. Rao: Engineering Optimization, John Wiley & Sons, Inc., Hoboken, New Jersey, 2009.</td><td></td><td></td></tr>
<tr><td>Standards and regulations: ISO 500001, EEDI, SEEMP</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. Group of authors: New Marine engineering, Volume I, II, London, 2000.
2. W. E. Haynes: Marine Engineering Workbook, Volume I, II, III, MMA, 1999.
3. Group of authors: Marine Engineering, The society of Naval Architects and Marine Engineers, 601 Pavonia Avenue, Jersey City, N. J. 1992.
4. S. H. Henshall: Medium and High Speed Diesel Engines for Marine Use, The Institute of Marine Engineers, London, 1996.
5. J. Cowley: The running and Maintenance of Marine Machinery, The Institute of Marine Engineers, London, 1994.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MECHANISMS IN MARINE ENGINES</td></tr>
<tr><td>Code</td><td>-</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Đorđe Dobrota, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarise the students with the theoretical and empirical insights into technical areas associated with the systems for transferring and conversion of motion, forces and energy.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Determine the structure of a mechanism.
2. Anticipate the implementation of a suitable analysis of a marine mechanism.
3. Perform a kinematic and dynamic calculation of the parameters when assessing a marine mechanism.
4. Master the methods of balancing the mechanisms.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Mechanisms: structure of mechanisms. Kinematic analysis of mechanisms. Kinematic pairs and chains. Closure and reversibility property of kinematic pairs.
2. Degrees of motion freedom of mechanisms. Mechanisms with intrinsic or false motion freedom. Mechanisms with passive connections. Actuators and drives.
3. Basic types of mechanisms. Plane mechanisms with lower kinematic pairs. Mechanisms with higher kinematic pairs. Curve mechanisms. Gear and rack mechanisms.
4. Kinematic analysis of mechanisms. Analytic and graphic determination of the speed and acceleration. The position plan of a mechanism, plan of speed and plan of acceleration.
5. Method of current poles.
6. Method of vector contour.
7. Method of body coordinates.
8. MIDTERM TEST 1.
9. Dynamic analysis of mechanisms. Forces, kinestatics, reactions in kinestatic pairs.
10. Dynamic analysis of the piston-crankshaft mechanism.
11. Forces acting in mechanisms, kinetics of the driving elements. Forces acting on the crankshaft in an in-line internal combustion engine. Kinematic analysis.
12. Dynamic analysis.
13. Balancing of mechanisms.
14. Dynamics of the curve mechanisms.
15. MIDTERM TEST 2.
Exercises:
1. Structural analysis of mechanisms.
2. Tasks containing determining of the motion freedom.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">3. Tasks containing determining of the motion freedom.
4. Tasks containing the ratios of gear drives.
5. Tasks containing the ratios of gear drives.
6. Graphical methods of the kinematic analysis of mechanisms. Method of the speed and acceleration plane.
7. Method of current poles.
8. Kinematic analysis of mechanisms. Method of vector contour.
9. Kinematic analysis of mechanisms. Method of vector contour.
10. Method of body coordinates.
11. Method of body coordinates.
12. Example of the dynamic analysis of the piston-crankshaft mechanism through the motion equation.
13. Example of determining the forces acting on the crankshaft in an in-line internal combustion engine. Kinematic analysis. Dynamic analysis.
14. Example of determining the forces acting on the crankshaft in an in-line internal combustion engine. Kinematic analysis. Dynamic analysis.
15. Examples of balancing the rotating and reciprocating masses.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam by taking 2 midterm tests during the semester. Taking midterms is compulsory.
Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final exam in the examination period.
The student who has passed all the midterm exams is expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade.
Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>0.75</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>3.25</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. There are two (2) midterm exams in the semester. The first comprises</td></tr>
</table>

Lectures 1-7 and is held in the 7th week, while the second midterm test comprises Lectures 8-14 and is held in the 15th week of the semester.
A student has to achieve at least 50% of the points to pass a midterm exam.
Students who fail or miss a midterm exam for justified reasons, can re-take the test in the first examination period. In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance and results of the midterm tests.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	18.75
1st midterm test	50	40.62
2nd midterm test	50	40.62

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Students who have fulfilled all course obligations but have failed or missed the midterm(s) have to register for the final exam in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Grading and continuous assessment of part-time students:

Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	M. J. Rider: *Design and analysis of mechanisms: a planar approach*, John Wiley & Sons, Ltd, West Sussex, 2015		Yes
	S. Doughty: *Mechanics of Machines,* 2nd edition, self-published, 2019.		Yes
	O. Vinogradov: *Fundamentals of kinematics and dynamics of machines and mechanisms*, CRC Press LLC, 2000.		Yes
	Z. Kulenović: *Mehanizmi*, Mašinski fakultet University of Banja Luka, 1991.		
Optional literature (at the time of submission of study	O. Muftić, K. Drača: *Uvod u teoriju mehanizama*, Faculty of Mechanical Engineering and Naval Architecture – University of Zagreb, 1974.		

programme proposal)	
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">OPERATIONAL RESEARCH</td></tr>
<tr><td>Code</td><td>PFP117</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Tatjana Stanivuk, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Goran Kovačević</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">10</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Fundamentals of the operational research. Application of quantitative methods for business decision making in shipping and maritime transport.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Define vector space, scalar product, norm, distance, and linear combination of vectors; differentiate linearly dependent and linearly independent sets of vectors;
2. Determine basic solutions for a system of linear equations;
3. Differentiate non-convex sets and convex sets; interior and boundary convex set (extremes);
4. Determine optimal production programs using simplex method;
5. Describe indoor and outdoor transport problem; identify or predict degeneration;
6. Determine initial solution and test an optimal solution to the problem of transport; solve the problem of distribution (optimal assignment);
7. Apply branch and bound method to solve traveling salesman problem.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Vectors. Vector spaces.
2. Elementary system solutions.
3. Gauss and Gauss-Jordan elimination method. Convex sets.
4. Fundamentals of linear programming. Standard problem and its canonical form.
5. General problem of linear programming.
6. Simplex method.
7. Solving problems of standard maximum.
8. Solving problems of standard minimum and Charnes Big M - procedure.
9. Problem of distribution and transport. Methods for determination of an initial solution to transport problem.
10. Testing of optimality. Method of jumping from stone to stone. MODI method.
11. Open transport problem. Degeneration in transport problem.
12. Problem of optimal assignment. Hungarian method.
13. Problem of a traveling salesman.
14. Branch and bound method.
15. Review.
Exercises:
1. Vectors. Euclidean spaces. Norm and vector distance. Base.
2. Elementary system solutions.
3. Gauss and Gauss-Jordan elimination method. Convex sets.
4. Fundamentals of linear programming. Standard problem and its canonical form.
5. General problem of linear programming.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">6. MIDTERM TEST 1.
7. Simplex method.
8. Solving problems of standard maximum.
9. Solving problems of standard minimum and Charnes Boig M - procedure.
10. Problem of distribution and transport. Methods for determination of an initial solution to transport problem.
11. Testing of optimality. Method of jumping from stone to stone. MODI method.
12. Open transport problem. Degeneration in transport problem.
13. Problem of optimal assignment. Hungarian method.
14. Problem of a traveling salesman. Branch and bound method.
15. MIDTERM TEST 2.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☒ consultation hours</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Full-time students are required at least 80% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits. Active participation in class and taking midterm exams (2 partial exams) during the semester. In case of passing both midterm exams, the students do not have to take the final written exam that takes place in the examination period. Oral exam takes place after written midterms exams / final written exam. Students apply for examination through the on-line service (“Studomat”). In the event of insufficient attendance, students cannot apply for the exam and have to re-register the course in the following academic year.

Obligations of part-time students:
differ from those of full-time students in terms of:
1. Attendance: at least 50% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits.
2. Midterm exams: the timing can be agreed with the course teacher in case a student cannot take the exam with other students for justified reasons.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td>0.875</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Homework</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>3</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

The written test can be taken as a complete test in the examination period or as two midterms. There are two midterm exams in the semester (in the 6th and 15th week).
Each midterm contains 3-4 tasks, each carrying the same amount of points.
A student has to achieve at least 50% of the points to pass a midterm exam.
A student who has passed both midterm tests is considered to have passed the entire final exam.
In case he/she has passed only one midterm, the final exam shall contain only the tasks that have not been completed in the respective failed or missed midterm.
It consists of 4-5 tasks, each carrying the same amount of points. Students must earn a minimum of 50% to complete the course.</td></tr>
</table>

After passing the written part of the exam, the student takes the oral exam. The student may be exempted from the oral part of the exam if he/she has made a significant effort during the class and is satisfied with the grade achieved on the written part of the exam.
The final grade comprises the class attendance and results of the midterm tests / final exam.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance and activity	80	10
1st Midterm test	50	35
2nd Midterm test	50	35
Total		70 – in this case, the student can take the oral exam

Final exam:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Theoretical exam (written)	50	60
Theoretical exam (oral)	50	30
Previous activities (include all elements of the continuous assessment	80	10

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
MareMathics; https://maremathics.pfst.hr/	-	Yes
M. Tomašević: *Matrični i vektorski račun*, University of Split – Faculty of Maritime Studies, Split, 1997.	48	-
Z. Babić: *Linearno programiranje*, University of Split – Faculty of Economics, Split, 2005.	15	-
Lj. Martić: *Matematičke metode za ekonomske analize II*, Narodne novine Zagreb, 1972.	1	-
Lj. Martić: *Nelinearno programiranje, odabrana poglavlja*, Informator Zagreb, 1973.		-

	Z. Zenzerović: *Operacijska istraživanja, zbirka zadataka*, University of Rijeka – Faculty of Maritime Studies, Rijeka, 1983.	1	
	F. S. Hillier, G. J. Lieberman, *Introduction to Operations Research*, 9th edition, McGraw Hill, New York, 2010.		
Optional literature (at the time of submission of study programme proposal)	1. D. Barković: *Operacijska istraživanja*, University of Osijek – Faculty of Economics, Osijek, 2001. 2. V. Čerić: *Simulacijsko modeliranje*, Školska knjiga, Zagreb, 1993. 3. Y. L. Chang: WinQSB: *Decision Support Software for MS/OM*, John Wiley & Sons Inc. New York, 1998.		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">GREEN TECHNOLOGIES IN MARITIME AFFAIRS</td></tr>
<tr><td>Code</td><td></td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Gorana Jelić Mrčelić, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Petra Jakulica</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4">20%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The objective of this course is to provide insights into the exploration, exploitation and protection of marine and submarine living and non-living resources, with particular emphasis on understanding the principles and application of green technologies in maritime affairs, in order to reduce human impact on the environment, but also to enhance competitiveness and sustainability in the maritime sector.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Argue an opinion on the need for the application of green technologies in the maritime affairs with the aim of improving competitiveness and sustainability in maritime sector management (ports and ships) and related strategies.
2. Assess the principles of green technologies, and determine the prerequisites for their application in different branches of the maritime sector from a technological, scientific, economic, social and ecological aspect.
3. Evaluate various methods and technologies.
4. Create the skills necessary for the proper procedure of assessment, acceptance and application of green technologies in the maritime sector.
5. Anticipate the needs and evaluate ways of environmental protection in maritime affairs.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:

1. Introduction to the course. Basic terms: Marine technologies. Underwater technologies. Sustainability. Principles of green and blue economy. Green and blue growth. Green economy and green technologies Objectives and importance of green technologies.
2. General trends in marine exploration, exploitation and protection throughout history.
3. Application of green technologies in maritime transport. Environmental impact of maritime transport.
4. Green ports - green technologies in ports. The importance of green ports and the green logistics chain. Methods for reducing environmental pollution in ports. Ecoports.
5. Green ships - green technologies on ships. Methods of reducing environmental pollution from ships.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">6. Green technologies in the approval industry and construction. Laying of submarine pipelines and cables. Heavy cargo ships.
7. Green technologies in shipbuilding. Recycling.
8. Green nautical tourism.
9. Application of green technologies for offshore energy extraction.
10. Application of green technologies in marine mining.
11. Renewable energy from the sea. Release of energy accumulated in the sea: thermal energy - solar energy, OTEC, tidal energy, waves, ... Wind power at sea.
12. Application of green technologies in extraction of minerals and drinking water from seawater - desalination.
13. Application of green technologies in the production of food from the sea. Fishing, breeding and processing of marine organisms. Fishing vessels. Overfishing and breeding problems. Protection of fish stocks and the environment.
14. Future trends in green technologies - Green shipping challenges: innovation, knowledge transfer, flexibility, availability and environmental security. "Cradle to cradle" design. Source reduction. Innovation. Viability.
15. Integrated Maritime Policy. "Blue Book" - Communication on an Integrated Maritime Policy for the European Union.

Exercises

1. Sustainability. Green economy and green technologies. Blue growth.
2. Green research Ships.
3. Green submarines and divers.
4. Green artificial islands.
5. Green heavy-lift ships.
6. Green ships for laying pipelines and cables.
7. Green platforms.
8. Green dry docks.
9. Green fishing ports and vessels.
10. Green dredgers.
11. Green plants for releasing energy accumulated in the sea.
12. Green desalination plants.
13. Green search and rescue vessels.
14. Future trends in green technologies.
15. Integrated maritime policy.</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td>☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.

The lectures are in PowerPoint presentations and are available on the Merlin e-learning platform. There is a possibility of visiting experts from a public or private company or NGO, and the possibility of assigning independent assignments to students (analysis of scientific articles).</td></tr>
</table>

<table>
<tr><td></td><td>The exercises are organized as auditory exercises.

Students can pass the exam by taking 2 midterm tests during the semester.

Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final written exam in the examination period.

The student who has passed all midterm exams is expected to register through the on-line service (Studomat) in the first examination period to register the final grade. Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td>Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>
<table>
<tr><td>Class attendance</td><td>1.125</td><td>Research</td><td>1.0</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Mid-term tests</td><td>2.875</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table>
</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td>Assessment and grading of full-time students:

Class attendance is mandatory and records of attendance are kept. Full-time students are required to attend at least 80% of classes (12 sessions / weeks) in order to take the exam and earn ECTS credits.

There are two midterm exams in the semester. Exam questions for students are available at the end of each session. A student has to achieve at least 50% of points to pass a midterm exam. Students who do not pass the 1st midterm test cannot access the 2nd.

Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final exam in the examination period. The student who has passed all midterm exams is expected to register through the on-line service (Studomat) in the first examination period to register the final grade. Students shall take the final oral exam in case they would like to achieve a higher grade.

Continuous assessment of students
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Midterm I</td><td>50</td><td>5500</td></tr>
</table>
</td></tr>
</table>

	Midterm II	50	

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:

Part-time students are required at least 50% of class attendance. The same grading and evaluation criteria apply to both full-time and part-time students.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	G. Jelić Mrčelić: *Morske tehnologije*, teaching materials, University of Split – Faculty of Maritime Studies, Split, 2015.	-	WEB

Optional literature (at the time of submission of study programme proposal)

1. Dundović Č., *Pomorski sustavi i pomorska politika*, University of Rijeka – Faculty of Maritime Studies, Rijeka, 2003.
2. The EU Blue Economy Report 2019. https://publications.europa.eu/en/publication-detail/-/publication/676bbd4a-7dd9-11e9-9f05-01aa75ed71a1/language-en/
3. OECD. The Ocean Economy in 2030. 2016. https://read.oecd-ilibrary.org/economics/the-ocean-economy-in-2030_9789264251724-en#page10

4. R. Bergqvist, J. Monios. Green Ports. 2019.

https://www.elsevier.com/books/green-ports/bergqvist/978-0-12-814054-3

5. EMEC. Green Ship Technology Book. 2010. https://www.oecd.org/sti/ind/48365856.pdf

Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">SHIPPING FINANCE</td></tr>
<tr><td>Code</td><td>PFP217</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Antonija Mišura, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">/</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td colspan="2">F</td></tr>
<tr><td>30</td><td></td><td>15</td><td colspan="2"></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">/</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Fundamentals of finance operations in maritime shipping – knowledge and skills necessary for responsible and successful core maritime activities.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1. Classify the possibilities of financing the building of new ships and acquisition of the used vessels.
2. Evaluate the plan of repayment of loans in maritime industry.
3. Recommend the protection against the increase in interest rates.
4. Analyse financial transactions when acquiring new and used vessels.
5. Provide arguments and opinions regarding the collaterals and guarantees when financing the acquisition of vessels.
6. Present the model of performing transactions.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Lectures:
1. General notions on investment in maritime shipping.
2. Financing the building of new ships from public sources and commercial banks.
3. Basic aspects of loaning and selling/acquiring used vessels.
4. Reasons for selling / acquiring used vessels.
5. Ways of financing.
6. Interests and principal; repayment.
7. Servicing the debt when expecting the influx of funds.
8. Analysis of financial transactions when selling/acquiring vessels.
9. Basic principles and conditions.
10. Anticipation of income through the ship exploitation.
11. Costs of business operations, analysis of profits and losses, debt servicing, risks, collaterals.
12. Documents in financial transactions and transaction performance.
13. Loan contracts, mortgage, deposit of interests.
14. Other collaterals and guarantees.
15. Models for performing transactions.
Exercises:
1. Loan repayment in liner shipping.
2. Loan repayment in tramp shipping.
3. Loan repayment in tanker trade.
4. Covering the risk of interest rate fluctuation through SWAP.
5. Covering the risk of interest rate increase through CAPO.
6. Covering the risk of interest rate increase through COLLAR.
7. Ship Mortgage Indemnity (SMI) financing.
8. Changes in demand and supply of newbuilding and their effects on the price of vessels.
9. Inter-dependence of the used ship price and freight rates.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">10. Effects of the ship age, market cycles and inflation on the used ship price.
11. Financing an acquisition of a vessel through mortgage collateral.
12. Acquisition of a vessel through a mortgage-stipulated commercial loan.
13. Acquisition of a vessel through a bank-guarantee commercial loan.
14. Acquisition of a vessel through a mortgage-stipulated and bank-guarantee commercial loan.
15. Project financing of the acquisition of the vessel.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Full-time students:
Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in lectures and exercises, in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Part-time students:
The same attendance requirements apply for part-time and full-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2.875</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:
There are 3 midterms – in the 5th, 10th and 15th week of the semester. Sample tests and exam questions are available at Merlin e-learning platform and upon completing each lecture class. A student has to achieve at least 50% of points to pass a midterm exam. If a student fails or misses the midterm(s), he/she take the oral exam comprising 9 questions. The final grade represents the achieved average. There is no written test.

Continuous assessment:
<table><tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr><tr><td>Class attendance</td><td>80</td><td>28.3</td></tr><tr><td>Midterm test I</td><td>50</td><td>23.9</td></tr><tr><td>Midterm test II</td><td>50</td><td>23.9</td></tr><tr><td>Midterm test III</td><td>50</td><td>23.9</td></tr></table>
Grading
<table><tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr><tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr><tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>M. Batalić: Financiranje u brodarstvu, authorized lectures, Faculty of Maritime Studies, Split, 2004.</td><td></td><td>Yes</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>1. M. Stopford: Maritime Economics, Routledge, London, 2000.
2. F. Paine: The Financing of Ship Acquisitions, Coulsdon, 1989.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="6">DATABASE APPLICATION</th></tr>
<tr><td>Code</td><td>PFP313</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Anita Gudelj, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">20%</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Learn various data models, database modelling principles, and develop the skills needed for using databases. Practical work with the database will enable the student to learn and master various methods of handling the database.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Present knowledge and understanding at a level that includes aspects of contemporary knowledge in the database area.
2. Create efficient databases.
3. Link a structural, operational, and integrity component of a Relational Data Model with problem solving in the database area.
4. Compare query creation using SQL language and query through examples.
5. Create an application by using an adequate system for managing databases and applying visual basic language.
6. Provide arguments based on the acquired knowledge and understanding.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction. Basic terms and definitions. Database management system.
2. Data model: data model definition, examples of different models, 3-tier architecture of database
3. Entity-relationship model.
4. Relations. Functionality of relations.
5. Relational model data (introduction, structure, integrity).
6. Conversion of conceptual scheme into relational.
7. Relational algebra – 1st part.
8. Relational algebra – 2nd part.
9. Functional dependencies.
10. Normalization.
11. MID-TERM EXAM.
12. Basics of VB programming.
13. Creating forms for data display.
14. Creating forms for data input, change and deletion.
15. Final presentation and report.
Exercises:
1. Introduction.
2. Introduction to MS Visio: Data modelling – terms; entity, attributes, data types
3. Entity-relationship diagram – various examples.
4. MID-TERM EXAM.
5. Work with tables.
6. Relationships between the tables.
7. Query work.
8. Queries – various examples. Reports.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">9. Database normalization – examples.
10. Exercise for the 2nd mid-term exam.
11. MID-TERM EXAM.
12. VB programming – examples.
13. Creating forms for data display.
14. Creating forms for data input, change and deletion.
15. Final presentation of the project.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in lectures and exercises (12 sessions / weeks), in order to take the exam and earn ECTS credits. Minimum class attendance for part-time students is 50%.
Students with insufficient attendance have to re-register the course in the following academic year.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>E-learning</td><td>0.5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>3.375</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

In addition to attending standard classes, the students have to use the Merlin e-learning platform. Over the semester, the students will undergo online tests through Merlin system, which include questions and practical tasks that have been previously dealt with in classes.
There is 1 midterm containing theoretical questions – it is held in the 10th week of the semester.
The midterm tests containing computer exercises take place in the 4th week (creating an ER model) and in 11th week (Access). Over the semester, students create a project assignment that represents the result of group work and smaller individual tasks. The project assignment is presented in the 15th week of the semester.
Sample tests and exam questions are available on Merlin e-learning platform and at the end of each class.
A student has to achieve at least 50% of points to pass a midterm test. Students who fail or miss a midterm exam for justified reasons, can re-take the test.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance, activity through e-learning, results of the midterm tests / final exam and the project assignment.
The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
</table>
</td></tr>
</table>

Class attendance	80	22.6
E-learning	80	10.0
Midterm test 1	50	33.7
Midterm test 2	50	33.7

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:

The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	Presentations contained in lectures and exercises, available on Merlin e-learning platform.		Web
	M. Pavlić: *Oblikovanje baze podataka*, University of Rijeka – Department of Informatics, Rijeka, 2013.		

Optional literature (at the time of submission of study programme proposal)	1. R. Manger: *Baze podataka*, Zagreb, Element, 2014. 2. M. Varga: *Upravljanje podacima*, Zagreb, Element; 2012. 3. H. Garcia-Molina, J. D. Ullman, J. Widom: *Database Systems: The Complete Book*, Prentice Hall, 2002. 4. C. J. Date: *An Introduction to Database Systems*, 8th ed., Addison Wesley, Boston, 2006.
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.

<table>
<tr><td>NAME OF THE COURSE</td><td colspan="5">POLLUTION REMOVAL TECHNOLOGY</td></tr>
<tr><td>Code</td><td>PFN208</td><td>Year of study</td><td colspan="3">1</td></tr>
<tr><td>Course teacher</td><td>Merica Slišković, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td>0</td><td>15</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="3">low level of e-learning (10%)</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Link preventive and operational activities of removing different types of pollution.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">1. Predict and compare the most common types of pollutants from ships, and predict their behaviour in marine environment.
2. Classify, self-assess and choose appropriate equipment to be used in various conditions of spills.
3. Predict parameters and assess spill and plan a proper response strategy, methods and equipment.
4. Evaluate advantages and limitations of different strategies of action depending on the type of spill.
5. Select appropriate equipment depending on the type of spill.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lectures

1. Types and sources of marine pollution.
2. Pollution of marine environment with oil from ships.
3. Characteristics of oil spills and oil behaviour in marine environment.
4. Planning and stages of cleaning operations (stage I and stage II).
5. Intervention on oil spill - action.
6. Measures/methods of removing oil marine pollution - operational activity.
7. Methods of removing oil from sea surface: barriers; collectors; sorbents; sprayers. Ignition.
8. Alternative methods of removing oil from sea surface.
9. Methods of removing oil from the mainland - coast cleaning.
10. Waste disposal - transportation, storage and handling of collected oil.
11. Measures/methods of removing oil marine pollution - preventive activity
12. Types of chemical spills and behaviour of hazardous and noxious substances (HNS) in marine environment.
13. Planning and stages of cleaning operations.
14. Methods of intervention on an incident involving chemicals transported in bulk.
15. Methods of intervention on an incident involving chemicals transported in packages.

Exercise

1. Manual on Oil Pollution: IMO Guidelines for Sampling & Identification of Oil Spills.
2. CleanSeaNet.
3. Pollution removal technology after the Exxon Valdez accident.
4. Pollution removal technology after the Amoco Cadiz accident.
5. Pollution removal technology after the Prestige accident.
6. Pollution removal technology after the Erika accident.
7. Pollution removal technology after the Torrey Canon accident.
8. Pollution removal technology after the Sea Empress accident.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">9. Pollution removal technology after the Aegean Sea accident.
10. Pollution removal technology after the Jakob Maersk accident.
11. Pollution removal technology after the New Carissa accident.
12. Case Study – removal of hazardous and noxious substances (HNS) from the marine environment.
13. Case Study – removal of HNS from the marine environment.
14. Case Study – removal of HNS from the marine environment.
15. Case Study – removal of HNS from the marine environment.</td></tr>
<tr><td>Format of instruction:</td><td colspan="3">☒ lectures
☒ seminars
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Attendance to lectures and exercises is mandatory. To be eligible for signature, a student has to attend a minimum of 80% of lectures (12 sessions) and 100% of exercises. If a student does not achieve a minimum percentage of attendance on lectures and exercises, he/she cannot take the exam and has to apply for the course one more time in the next academic year.
Students can pass the exam through continuous evaluation successfully passing one mid-term test during the semester. Students are obliged to produce a seminar essay individually or in a team. Students who do not pass the mid-term test, but have fulfilled other course obligations, shall take a written exam during the examination period.
Students who successfully pass the mid-term test and produce the seminar essay have to make a formal application for the final exam using Studomat (Exam application service) in the first examination period. A student can take an oral exam if he/she wants to get a better grade.

Obligations of part-time students

Part-time students have to attend a minimum of 50% of classes. The grading and evaluation criteria are the same as for full-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1,125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Independent assignment</td><td>0.875</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Test</td><td>2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Grading of full-time students:
The student performance is continuously assessed during the semester. Students are obliged to complete independent assignments on time. These assignments carry 20% of the final grade. The seminar essay (case study) carries 30% of the final grade. It has to be produced on time according to the teacher's guidelines and presented in class in written and oral way.
Furthermore, one mid-term test is held in the 10th week of the semester. The examples of test questions are available to students on Merlin e-learning platform and at the end of each lecture. The test is successfully passed if a student achieves a minimum of 50% of total points. Students who do not take the tests for duly justified reasons or do not achieve a minimum percentage on the test, are given a possibility to take the test one more time.</td></tr>
</table>

Continuous assessment:

Elements of evaluation	Success (min.%)	Percentage (%)
Class attendance	80	10
Independent assignments	50	20
Seminar essay	50	30
Mid-term test	50	40

Grading:

Percentage (%)	Criteria	Grade
0-49	does not meet the minimum criteria	insufficient (1)
50-64	meets the minimum criteria	sufficient (2)
65-79	average achievement with noticeable insufficiencies	good (3)
80-89	above average achievement with few mistakes	very good (4)
90-100	extraordinary achievement	excellent (5)

Students who do not pass the mid-term test, but have fulfilled other course obligations, shall take the final written exam during examination period. The same criteria for the finale am and for continuous evaluation are applied during examination period.

Grading and evaluation of part-time students

A part-time student has to attend a minimum of 50% of lectures.
The grading and evaluation criteria are the same as for full-time students.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	1. Slišković, M.; Jelić Mrčelić, G.: *Tehnologija uklanjanja onečišćenja*, teaching materials at Merlin e-learning platform. 2. IMO, *Manual on Oil Pollution – Section I – VI*. 3. IMO, *Manual on Chemical Pollution – Section I-II*. 4. IMO, *Manual on oil spill risk evaluation and assessment of response preparedness*, 2010		YES
Optional literature (at the time of submission of study programme proposal)	1. Bićanić, Z.: *Zaštita mora i morskog okoliša*, Faculty of Maritime Studies in Split, Split, 2003.		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">REMOTE SENSING IN A FUNCTION OF SUSTAINABLE DEVELOPMENT OF THE MARITIME SECTOR</td></tr>
<tr><td>Code</td><td>/</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Anita Gudelj, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Ante Čalić
Zdeslav Jurić, PhD, assistant professor
Merica Slišković, PhD, full professor
Igor Vujović, PhD, full professor
Miro Petković, PhD, assistant professor</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>15</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4">20%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">To enable students to acquire knowledge about remote sensing data for the purpose of sustainable development of ports and marinas, maritime transport, and the involved cities.
Support in capacity building for remote data collection and development of students' digital skills.
Students will be able to use the acquired knowledge and skills for further research / employment / application of projects aimed at contributing to the sustainable development of ports (energy efficiency, sea pollution...) and their cities.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">1. Analyze images using the ENVI web geoportal comprising various data.
2. Analyze conditions for adjusting the data gathered via satellites to specific usages (emissions, pollution, exhaust gases…).
3. Assess the quality of the marine environment using remote sensing methods.
4. Estimate the energy (exergy) potential of a segment of moist air in the surrounding atmosphere.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lectures and Exercise:
1. Introduction to remote sensing. Overview of the principles and concepts of remote sensing (3h). Lab: no exercise.
2. Research and data gathering with the aid of satellites. Lab1: Start working with QGIS – installation of QGIS & SNAP (1h).
3. Data collection, processing and analysis (1h). Lab2: Receiving and previous processing of the satellite data SENTINEL 1 and SENTINEL 2 (2h).
4. GIS data modelling. Raster and vector data. Spectral indices in remote sensing for environment monitoring (1h). Lab3: Data visualisation with the aid of QGIS. Case study: detection of vessels by SENTINEL-1 (2h).
5. Lab4: Combining Sentinel-1 and Sentinel-2 data for multispectral imaging. Case study: detection of plastics (3h).
6. Image classification (1h). Lab5: Classification of satellite images (2h).
7. Oceanography and remote detection (2h). Lab 6: Analysis of trends in sea surface and energy properties through the data collected by satellites (1h).
8. Case study: Analysis of trends in sea surface temperature (3h).</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">9. Application of remote sensing in geophysical processes (2h). Lab8: Analysis of atmospheric composition and air quality within maritime domain (1h).
10. Lab9: Case study: Analysis of the effects of maritime traffic (3h).
11. Monitoring the environmental conditions (1h). Lab10: Identifying threats to the environment by using remote sensing data. Case study: recognising the anomalies in trends in the sea water colour (2h).
12. Monitoring the sea water quality by using remote sensing methods (1h). Lab11: Detection of oil spills into the sea (2h).
13. Introduction to using Python for geospatial analysis (1h). Lab12: Creating basic scripts for data manipulation and visualisation (2h).
14. Case study: How to analyse 5 different areas over 5 years in a few minutes? (3h).
15. Group projects – presentation of the results (3h).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☒ partial e-learning
☐ field work</td><td colspan="3">☒ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in lectures and exercises, in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam through the continuous assessment over the semester. Independently or in teams, students have to explore the assigned topics as independent tasks.
Students who have earned enough points during classes shall apply for the exam through the on-line service (Studomat) in the first examination period to obtain the grade or to take the final exam in case they would like to achieve a higher grade.

Part-time students:

A part-time student has to attend a minimum of 50% of lectures and 50% of exercise in order to take the exam. The grading and evaluation criteria are the same as for full-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td>1</td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Laboratory exercise</td><td>0.875</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Independent assignments</td><td>1</td></tr>
<tr><td>Midterm tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Students are required to complete laboratory exercises during class. Each student is required to conduct research and complete an independent assignment on a given topic. The final grade is based on class attendance, laboratory exercises, conducted research and completed independent assignment.

Continuous assessment:</td></tr>
</table>

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	10
Laboratory exercise	100	20
Independent assignment	100	35
Research	100	35

Grading

Points (%)	Criterion	Grade
0-49.9	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64.9	Performance meets the minimum criteria	Sufficient (2)
65-79.9	Generally sound work, with a number of notable errors	Good (3)
80-89.9	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	Cengel, Y., and Boles, M., *Thermodynamics: An Engineering Approach*, McGraw-Hill Education, 2014.		
	Zou Guangrong: *Ship energy efficiency technologies – now and the future*,https:// publications.vtt.fi /pdf/technology/2017/ T306.pdf, 2017.		Yes
	Prevention of Pollution from Ships (MARPOL). https://www.imo.org/en/about/ Conventions/Pages/International- Convention-for-the-Prevention-of-Pollution- from-Ships-(MARPOL).aspx (accessed February 13, 2023)		
Optional literature (at the time of submission of study programme proposal)	*Ulyssys Water Quality Viewer*, (2020). https://custom-scripts.sentinelhub.com/sentinel2/ulyssys_water_quality_viewer Zlinszky, A.; Padányi-Gulyás, G. (2020). *Ulyssys Water Quality Viewer Technical Description Supplementary*. Preprints, 2020010386 (doi: 10.20944/preprints202001.0386.v1).		
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).		
Other (as the proposer wishes to add)			

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">SEA ACCIDENT INVESTIGATION</td></tr>
<tr><td>Code</td><td>PFN203</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Danijel Pušić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">20%</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarize students with legal framework of marine incident investigations, definition of marine incident investigation, definitions of risk in maritime transport. Familiarize students with the characteristics of risk. Provide an insight into the investigation of marine incidents, examples of accidents at sea. Teach students to calculate risk probability, value of human life and acceptability of risk.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Assess regulations that are applicable to marine incidents and expertise.
2. Identify and classify marine risks in maritime transport, impact of human error.
3. Evaluate methods of marine incident investigations - case study.
4. Identify and quantify risks and acceptability of risk.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures
1. Definition of incident. Definition of maritime risk. Legislation framework for investigation of marine accidents.
2. Analysis of risk assessment and risk management.
3. Risk analysis using Formal Safety Assessment (FSA) methodology.
4. Analysis of acceptability of risk and loss of human life on ship. Analysis of value of loss of human life on board. GCAF, NCAF, ICAF.
5. Condition of maritime transport. Determining marine risk in the Republic of Croatia. Measures to prevent and reduce risk.
6. Analysis of maritime incidents. Case studies of individual incidents.
7. Analysis of maritime incidents. Case studies of individual incidents.
8. Methodology of maritime incident investigation. Midterm Test 1.
9. Structure of maritime incident investigation in the Republic of Croatia. Powers of maritime inspector. Powers and work of Harbour Master’s Offices. Powers and functioning of Aircraft, Maritime and Railway Accident Investigation Agency the Ministry of the Sea, Transport and Infrastructure.
10. Analysis of areas of increased traffic in the Republic of Croatia and measures to prevent maritime incidents. Inspection, traffic control, classification societies.
11. Preventive inspections of ships. Methodology of survey of ships by the Paris MoU.
12. Rescue operations I: Plan of operations, analysis of factors, organization and actions.
13. Rescue operations II: Starting and running of operations.
14. Organization and structure of the Coast Guard in the world and in Croatia. Midterm Test 2.
15. Development and planning of measures for prevention of maritime risks and incidents.
Exercises
1. Inspection of ship’s documents and detecting non-compliances.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">2. Examples of documents for ship inspection according to Paris MoU.
3. Examples of documents for ship inspection according to Paris MoU.
4. Risk analysis using the FSA methodology.
5. Risk analysis using the FSA methodology.
6. Examples of GCAF, NCAF, ICAF calculations.
7. Examples of GCAF, NCAF, ICAF calculations.
8. Methodology of marine incident investigations.
9. Methodology of marine incident investigations.
10. Case study: investigation of the grounding of the Marko Polo on the islet of Ist.
11. Case study: investigation of the grounding of the Marko Polo on the islet of Ist.
12. Case study: investigation of the grounding of the Costa Concordia.
13. Case study: investigation of the grounding of the Costa Concordia.
14. Case study: investigation of the grounding of the Exxon Valdez.
15. Case study: investigation of the grounding of the Exxon Valdez.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam by taking 2 midterm tests during the semester.
Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final exam in the examination period.
The student who has passed all midterm exams is expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade.
Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>3.875</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. There are two midterm exams in the semester – held in the 7th and the 14th week of the semester. A student has to achieve at least 50% of the points to pass each midterm exam.
Taking midterm tests is a duty. A student who has failed or missed the 1st midterm cannot take the second one.</td></tr>
</table>

In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
Students who have earned enough points during classes shall apply for the exam through the on-line service (Studomat) in the first examination period to obtain the grade or to take the final exam in case they would like to achieve a higher grade.
The final grade comprises the class attendance and results of the midterm tests.
The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance	80	22.4
1st Midterm test	50	38.8
2nd Midterm test	50	38.8

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:

Part-time students are required at least 50% of class attendance in lectures and exercise. The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
J. Reason, *Managing the Risks of Organizational Accidents*, Ashgate Publishing, Hampshire, England		Presentation on the WEB
S. Kristiansen: *Maritime Transportation: Safety Management and Risk Analysis*, Elsevier Butterworth-Heinemann, Burlington, UK, 2005.		Partly on the WEB
IMO risk assessment		WEB
Lectures of the course teacher – available at Merlin e-learning platform.		WEB

Optional literature (at the time of submission of study programme proposal)

M. Hess, S. Kos, M. Njegovan: *Procjena i kontrola operativnih rizika na brodu u skladu s ISM pravilnikom*, Pomorstvo, University of Rijeka – Faculty of Maritime Studies, Rijeka, 2011.

Quality assurance methods that ensure the

Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the

acquisition of exit competences	examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">MARINE PROPULSION SYSTEM</td></tr>
<tr><td>Code</td><td>PFS206</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teachers</td><td>Ladislav Stazić, PhD</td><td>Credits (ECTS)</td><td colspan="4">6</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Karlo Bratić, PhD</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4">-</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with marine propulsion systems, their purpose and components: propeller, propulsors (propulsion units), propeller shaft, intermediate shaft, thrust shaft, bearings, gearbox shafting, couplings, as well as main propulsion engine crankshaft. Introduction to the principles for defining their structural form, dimensioning, selecting the building material and determination of service loading. Detailed strength calculation and assessment of the individual components of marine propulsion systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No requirements.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Suggest a suitable design and component material of the propulsion system (marine screw propeller, shafts and connecting parts),
2. Determine propulsion load,
3. Perform dimensioning or check the selected dimensions.
4. Determine the stationary response of the individual components under stationary service loading (displacements, deformations, forces, stresses – as needed).
5. Anticipate the acceptability criteria, calculate and check the assembling of the components (propeller shaft as a whole).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures (30 hours):
1. (1h) Introduction to the course. Learning outcomes. Contents of lectures and exercises. Students’ attendance and obligations. Assessment of student performance and grading. Literature and other sources. Examination.
2. (4h) Introduction: marine propulsion systems, basic notions, resistance and propulsion (thrust). Ship as the technical system. Energetic system in ships. Marine propulsion system: composition and transfer of power. Efficiency of marine propulsion systems. Purpose and concepts of marine propulsion systems. Basics about ship resistance and thrust.
3. (3h) Historical overview of development of marine propulsion systems. Propulsion by sails. Steam reciprocating plant. Steam turbine plant. Diesel engine and propulsion. Gas turbine and nuclear propulsion. Modern marine propulsion plants. Development of the internal combustion engine. Modern diesel plants. Types of propellers and thrusters. Modern designs of vessels. Further development and future of diesel engines.
4. (4h) Components of the vessel’s propulsion system: screw propeller (design features and loads: thrust, power), shaftline (propeller shaft, intermediate shaft, thrust shaft, thrust bearing, shaft connections). Marine gearboxes (reduction gearboxes and clutches), shaft couplings, two- and four-stroke marine Diesel engines.
5. (2h) Marine screw propellers: structural forms, dimensions and dimensioning, materials, service loading, strength calculations and verification. Propeller loading (torque and forces) due to resistance and thrust. Dimensioning of</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">propellers and verification of blade thickness in accordance with class rule requirements. Speed of the vessel, cavitation.
6. (2h) Propulsors, i.e. stand-alone propulsion units: units for propulsion and steering, duct propeller, Voith-Schneider type of cycloid propulsor, steerable thrusters (azimuth, Azipod, Siemens-Schottel Propulsor – SSP. Water jet propulsors.
7. (2h) MIDTERM TEST 1 – theoretical part.
8. Connecting screw propeller with its propeller shaft: conceptual forms of connections, relevant values, dimensions, material and loading. Calculation of assembling of propeller screw with the propeller shaft. Allowable values due to slipping and strength. Longitudinal displacement, pressure and force at operating temperature. Diagrams of shrink fitting.
9. (4h) Shafting: propeller shaft, intermediate shaft, thrust shaft, flanges, removable couplings, connecting parts. Selection of form, dimensioning, choice of material, and determination of loading. Limiting of the propulsion engine power. Calculations of number of shaft revolutions when the engine power reduction is required. Dimensioning of propeller shafts, intermediate shafts and thrust shafts in accordance with the class rule requirements.
10. (3h) Shaftline bearings: purpose and types, choice of bearings type (sliding vs. rolling type), sliding type bearings, rolling type bearings, class requirements for the bearings, lubrication, recommended distance between stern-tube bearings.
11. (1h) Connection of shafts: coupling types, their assembling and disassembling. Coupling bolts: standard, reamer, hydraulic.
12. (2h) MIDTERM TEST 2 – theoretical part.
Exercise (15 hours):
1. Introduction. Marine propulsion system. Basics about ship resistance and thrust.
2. Efficiency of marine propulsion systems. Resistance and thrust of the vessel.
3. Marine screw propellers: evaluation of strength.
4. Connecting screw propeller with its propeller shaft.
5. Shafting: a complex set.
6. Intermediate shaft.
7. Thrust shaft.
8. Screw propeller shaft.
9. MIDTERM TEST 1 – numerical part.
10. Connection elements: standard, reamer, hydraulic bolts.
11. Flanges and removable couplings.
12. Engine power reduction.
13. Shaftline bearings.
14. Connection of shafts.
15. MIDTERM TEST 2 – numerical part.</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☒ partial e-learning
☐ field work</td><td>☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:
Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.</td></tr>
</table>

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*

Class attendance	1.125	Research		Practical training	
Experimental work		Report		E-learning	
Essay		Seminar essay		(Other)	
Midterm tests	4.875	Oral exam		(Other)	
Written exam		Project		(Other)	

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

Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as **two midterms**. The first midterm test comprises Lectures 1-6 and is held in the 9th week, while the second midterm test comprises Lectures 7-10 and is held in the 15th week of the semester.
The **theoretical and numerical parts of the midterm exams** are scored separately (0 to 100 points). A student has to achieve at least 50% of points to pass a midterm exam, theoretical or numerical.
Students who have earned enough points through midterm tests shall apply for the exam through the on-line service ("Studomat") in the first examination period to obtain the grade or to take the **final oral exam** in case they would like to achieve a higher grade.
Students who fail or miss a midterm exam shall apply for the **complete final written test** in the examination period.
Sample tests are available at Merlin e-learning platform and upon completing each lecture class.
The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	0
Midterm test 1 – theoretical part	50	25
Midterm test 1 – numerical part	50	25
Midterm test 2 – theoretical part	50	25
Midterm test 2 – numerical part	50	25

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)

<table>
<tr><td></td><td>
<table>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>Croatian Register of Shipping, Pravila za klasifikaciju pomorskih brodova, Part 7 - Engines, Hrvatski registar brodova, Split, 2008.</td><td>-</td><td>Yes</td></tr>
<tr><td>Basic principles of ship propulsion - Optimisation of hull, propeller and engine interactions for maximum efficiency (publication No. 5510-0004-04), MAN Energy Solutions, Copenhagen, 2018.</td><td></td><td></td></tr>
<tr><td>IACS UR M68, Dimensions of propulsion shafts and their permissible torsional vibration stresses, International Association of Classification societies, London, 2015.</td><td></td><td></td></tr>
<tr><td>IACS UR K3, Keyless Fitting of Propellers without Ice Strengthening, International Association of Classification Societies, London, 1998.</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>

Bearings, No. 39 66 13 14, MAN B&W Diesel A/S, Copenhagen, 2000.
CP Propeller Equipment - Product Information, MAN Diesel, Copenhagen, 2007.
Hydrodynamics of Ship Propellers, MAN B&W Diesel A/S, Copenhagen,1998.
Marine propulsion systems - An Outlook, MAN B&W Diesel A/S, Copenhagen, 1997.

</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td>In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.</td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">POWER EFFICIENCY OF MODERN MARINE POWER SYSTEMS</td></tr>
<tr><td>Code</td><td>PFS236</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Zdeslav Jurić, PhD
Gojmir Radica, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the definition of energy efficiency and the methodology for establishment and certification of the energy efficiency index in maritime shipping, in line with the IMO-MARPOL regulations. Introduction to energy features of various configurations of modern onboard energy systems. Students will be able to recognise the methods for energy management on board ship during her exploitation and the impact of the ship’s harmful emissions on the marine environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course “Marine power systems” taken and attended previously.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Discuss the contents of relevant IMO-MARPOL (MEPC) regulations and resolutions referring to energy efficiency on board, the Energy Efficiency Design Index (EEDI).
2. Determine the influence of individual components of the marine energy system on the energy efficiency index.
3. Control and suggest the application of the standardised procedure of the verification of the project index of the energy efficiency in the stage of designing, building and handing over the vessel.
4. Analyse and explain the risks in the overall energy efficiency for various onboard configurations.
5. Evaluate the influence of innovative, energy-efficient technologies on the overall index EEDI.
6. Determine the impact of the application of integrated energy systems and alternative energy sources on energy efficiency and environmental acceptability.
7. Interpret and apply the rules of the relevant classification societies.
8. Argument opinions when participating in the development of plans for efficient management of energy consumption on board (SEEMP).
9. Organise and coordinate the implementation of the ship’s plan for energy efficiency management (SEEMP).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the course. Importance of the International Convention MARPOL – Annex VI.
2. Project index of the energy efficiency. Definition and description of the certification procedure.
3. The achieved EEDI (Energy Efficiency Design Index), Rulebook 20 (Resolution MEPC 203)
4. The required EEDI, Rulebook 21 (Resolution MEPC 203)
5. Generic scheme of the ship’s energy system and the model for determining the Energy Efficiency Design Index (EEDI).
6. Definition of the individual units of the model for determining the EEDI (1).
7. Definition of the individual units of the model for determining the EEDI (2).</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">8. Measures for improving energy efficiency – reducing the EEDI.
9. Energy efficient innovative technologies and evaluation of their effects on the EEDI.
10. Generic scheme of the ship’s energy system featuring innovative technologies, calculation model.
11. Plan for energy efficiency management (SEEMP). Definition and application.
12. Structure and development of the SEEMP.
13. Good practice guidelines for efficient energy consumption management on board ship.
14. Optimisation of the vessel’s speed, effects of maintaining the hull and propulsion system on the energy consumption.
15. Using computer tools and expert systems for energy management, energy balance.

Exercises:

1. Elements of the project task when calculating the index of energy efficiency.
2. Energy balance of the vessel.
3. Calculation model for determining the energy efficiency (1).
4. Calculation model for determining the energy efficiency (2).
5. Generic scheme of the ship’s energy system.
6. Assignment of seminar papers.
7. Creation of the seminar paper in consultation with the course teacher.
8. Creation of the seminar paper in consultation with the course teacher.
9. Creation of the seminar paper in consultation with the course teacher.
10. Creation of the seminar paper in consultation with the course teacher.
11. Creation of the seminar paper in consultation with the course teacher.
12. Creation of the seminar paper in consultation with the course teacher.
13. Creation of the seminar paper in consultation with the course teacher.
14. Creation of the seminar paper in consultation with the course teacher.
15. Delivery of the seminar paper.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☒ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. Students with insufficient attendance cannot take the exam and have to re-register the course in the following academic year.
Students are assigned tasks to be carried out through individual or team work, using the e-learning material. In addition, students have to create and present a seminar paper, according to the course teacher's guidelines.

Obligations of part-time students:

Part-time students are required at least 50% of class attendance in lectures, seminars and workshops.</td></tr>
<tr><td rowspan="3">Screening student work (name the proportion of ECTS credits for each activity so that the total number of</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1.5</td><td>(Other)</td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">ECTS credits is equal to the ECTS value of the course)</td><td>Midterm tests</td><td>2.375</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">
There are two midterm exams in the semester. The students who do not pass the first midterm test cannot take the second midterm test.
Examples of the tests and exam questions are available at Merlin e-learning platform.
Students who have fulfilled all course obligations but have not managed to pass the midterm test, have to take the final written exam in the examination period. The same evaluation criteria apply for the continuous assessment of student achievements and for the final examination.
The final grade comprises the class attendance, results of the midterm tests / final exam and the seminar paper.

Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>22.5</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>30.0</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>23.75</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>23.75</td></tr>
</table>
Grading
<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td colspan="6">
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>International Convention MARPOL, 1973/78</td><td>5</td><td>Yes</td></tr>
<tr><td>MEPC 2014 Guidelines on the Method of Calculation of the Attained Energy Efficiency Design Index (EEDI) for New Ships, MEPC Resolution 245(66), London, UK, 2014.</td><td></td><td>Yes</td></tr>
<tr><td>MEPC 203(62), Inclusion of regulations on energy efficiency for ships in MARPOL Annex VI, IMO, 2011</td><td></td><td>Yes</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">
1. Deltamarine: Study on tests and trials of the Energy Efficiency Design Index as developed by the IMO, Raisio, 2011.
2. I. Ančić, A. Šestan: Influence of the required EEDI reduction factor on the CO2 emission from bulk carriers, Energy Policy, 2015.
</td></tr>
</table>

	3. I. Ančić, A. Šestan, N. Vladimir, V. Klisarić: *Influence of New Power Sources on the Attained EEDI*, Influence of EEDI on Ship Design Conference, RINA, London, UK, 2014.
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="6">NEW DIAGNOSTICS AND CONTROL TECHNOLOGIES</th></tr>
<tr><td>Code</td><td>PFE110</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Ivana Golub Medvešek, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teacher</td><td rowspan="2">Nediljko Bugarin</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5">0</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Introducing new technologies and techniques in fault diagnosis and systems management, especially those on board. Knowledge of implementation methods and methodologies for applying new diagnostics and management technologies and techniques. Calculation of time to failure and service intervals during maintenance. Get acquainted with new technologies in the field of systems management, such as Internet of Things (IoT), cloud (cloud computing), infrared diagnostics, signal vibration diagnostics, fuzzy logic, expert systems, artificial neural networks, smart electrical networks, data fusion with more sensors and integrated operation of marine systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Critically evaluate how the system redundancy is introduced.
2. Quantify the reliability of the ship's system.
3. Determine the justification for introducing sensor fusion in a particular application.
4. Assess whether it is possible to make the following journey from the thermographic report and the mean time to failure.
5. Judge the expertise of the expert system in your workplace.
6. Suggest the introduction of a backup system at some point in the system.
7. Predict the dangers of using ANN, IoT, cloud, fuzzy logic or expert system at some point in the system.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction. Terms in fault diagnosis and management. Determination of system reliability and availability.
2. Integration of marine systems. The role of information and communication technologies in integrated ship functioning. The concept of integrated ship functioning. Diagnostics and management of marine propulsion systems.
3. Possibilities for improvement of existing control and diagnostics systems for marine (e.g. diesel) engines. FDI scheme based on symptom-failure relationships and trend analysis.
4. Sensor and actuator fault diagnosis. Sensor networking. Fault tolerance management schemes. Software structures of fault tolerant SU.
5. The Internet of Things - concepts, dangers, benefits.
6. Vibration analysis of the ship's machine by frequency and time-frequency procedures with the purpose of fault detection.
7. Frequency response of characteristic machine failures.
8. Infrared cameras, principle of operation and characteristics.
9. Thermographic diagnostics of failures. Examples of marine systems thermographic analysis reports.
10. Artificial neural networks example of sensor processing of marine diesel engine signals.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">11. Smart networks - term, examples, modern diagnostics technologies in the smart grid transmission system.
12. Expert systems - concepts, types and examples in maritime affairs.
13. Fuzzy logic.
14. Multisensor Fusion - advantages, applications in civil and military systems.
15. Cloud Technology - concepts, features, benefits and disadvantages.
Exercises:
• Introduction to Exercises. Examination of the signals from the bearing vibration.
• 2-3. Reliability and availability of a computer system.
• 4- . UNM (9 hours): CNN applications in the land-based industry and maritime affairs – by using Neural Networks in Command Window and GUI Environment, Fuzzy-Neural environment and Fusion of Sensory Data.
Specification:
• Introduction to UNM Command Window and GUI (2 hours).
• CNN example in land-based industry (3 hours).
• CNN example in maritime affairs (3 hours).
• CNN example of combination with fuzzy logic (1 hour).
• CNN example of combination with sensory fusion (1 hour).
• 3D printing (3 hours).</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Full-time students.
Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of attendance in lectures and 100% in computer and laboratory exercises in order to take the exam and earn ECTS credits. If a student miss a part of the course for justified reasons, he/she can compensate for absence by carrying out a seminar work or project. Students with insufficient attendance cannot take the exam and have to re-register the course in the following academic year.
Part-time students.
Part-time students are required at least 50% of attendance in lectures and 100% in computer and laboratory exercises in order to take the exam and earn ECTS credits. If a student miss a part of the course for justified reasons, he/she can compensate for absence by carrying out a seminar work or project.</td></tr>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Computer exercise</td><td>0.25</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Laboratory exercise</td><td>0.25</td></tr>
<tr><td>Midterm tests</td><td>2.375</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:
Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two</td></tr>
</table>

midterm exams during the semester. The first comprises Lectures 1-7 and is held after the 7th week in the semester, while the second midterm test comprises Lectures 8-15 and is held in the 15th week of the semester.
Sample tests and exam questions are available on Merlin e-learning platform.
A student has to achieve at least 40% of the points to pass a midterm exam.
Students who fail or miss a midterm exam for justified reasons, can re-take the test in the 15th week of the semester.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance and results of the midterm tests.
The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	50	0
Computer exercises	100	0
Laboratory exercises	100	0
Midterm test I	40	50
Midterm test II	40	50
(alternative: Seminar paper)	80	100

Grading

Points (%)	Criterion	Grade
0-39	Performance does not meet the minimum criteria	Insufficient - fail (1)
40-59	Performance meets the minimum criteria	Sufficient (2)
60-75	Generally sound work, with a number of notable errors	Good (3)
76-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures and 100% in exercises. The same grading and evaluation criteria apply to both full-time and part-time students.

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	R. Antonić: *Nove tehnologije dijagnostike i upravljanja*, University of Split – Faculty of Maritime Studies, Split, 2010.		WEB
	I. Vujović: *Zabilješke s predavanja*, University of Split – Faculty of Maritime Studies, Split, 2014.		WEB
	I. Vujović: *Vježbe na računalu*, University of Split – Faculty of Maritime Studies, Split, 2014.		WEB
Optional literature (at the time of submission of study	1. I. Kuzmanić, I. Vujović: *Reliability and Availability of Quality Control Based on Wavelet Computer Vision*, Springer Briefs in Electrical and Computer Engineering, Berlin, Springer Verlag, 2014.		

programme proposal)	2. I. Vujović: *Multiresolution Approach to Processing Images for Different Applications-Interaction of Lower Processing with Higher Vision*, SpringerBriefs in Electrical and Computer Engineering, Heidelberg: Springer Verlag, 2015. 3. M. Blanke: *Diagnosis and Fault-Tolerant Control*, Berlin, Springer, 2003. 4. A. Zilouchian M. Jamshidi: *Intelligent Control Systems Using Soft Computing Methodologies*, London: CRC Press, 2001. 5. J. Yen, R. Langari, L. A. Zadeh: *Industrial Applications of Fuzzy Logic and Intelligent Systems*, New York: IEEE Press, 1995. 6. M. Margaliot, G. Langholz: *New Approaches to Fuzzy Modelling and Control - Design and Analysis*, Bombai, World Scientific Publishing Co., 2001. 7. C. J. Lakhmi, W. S. Clarence: *Intelligent Adaptive Control - Industrial Applications*, New York: CRC Press, 1999. 8. Cloud Computing Tutorial, www.tutorialapoint.com
Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">CHAPTERS ON STRUCTURAL METAL MATERIALS</td></tr>
<tr><td>Code</td><td></td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Liane Roldo, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">1. To provide marine engineering students with the theoretical and practical fundamentals of conventional heat treatment of metals (ferrous and non-ferrous).
2. Study different types of metallic materials, the correlation of basic properties with microstructure, manufacturing processes and heat treatments, as well as their behaviour in application.
3. The use of metallography, from sample preparation for microstructure analysis by optical microscopy to hardness testing, all for a better understanding of the relationship between mechanical properties and microstructure.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended course in “Materials for marine applications”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Be able to independently test the properties of materials and comment on the results.
2. Know how to select the necessary heat treatment considering the type of alloy and application.
3. Know how to select the necessary material with regard to the application.
4. Understand the details of technical problems that arise in marine engineering.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Presentation and introduction to the course.
2. Defects in materials and the resulting mechanical properties.
3. Material technical specifications. Materials selection, tools and application.
4. Heat treatment: solubilization, spheroidization annealing, common annealing, normalization.
5. Surface heat treatment: quenching, tempering, precipitation hardening.
6. Heat and chemical treatment: surface hardening, thin films and coatings.
7. Marine engineering case problems related to materials and their application.
8. MIDTERM EXAM 1.
9. Microstructure, properties and applications of carbon steels, alloy steels, tool steels.
10. Microstructure, properties and applications of steels for welding, micro-alloyed steels, COR-TEN steels.
11. Microstructure, properties and applications of stainless steels.
12. Microstructure, properties and applications of cast irons.
13. Properties and applications of non-ferrous metals: aluminium and alloys, copper and alloys, tin and alloys.
14. Marine engineering case studies related to materials and their application.
15. MIDTERM EXAM 2.
Exercises:
During exercise hours, the students shall be divided in groups of 2 or 3 members. 1 hour – Selection of groups and practical tasks.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">2 hours – Preparing the projects for the selection of materials.
7 hours – Practical work: 3D printing.
During practical exercise, the students should: (1) familiarize with Grant's software; (2) determine the project parameters; (3) study the standards; (4) determine the properties that are relevant for the project; (5) select the functions and limits for the project; (6) analyse the project and perform adequate adjustments.
1 hour – Final consultations.
4 hours – Seminars and presentations.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☒ seminar paper</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time and part-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required to attend at least 80% of lectures, 100% of practical training / exercises, and 100% of laboratory exercises / field work, while part-time students are required to attend at least 50% of lectures, 100% of practical training / exercises, and 100% of laboratory exercises in order to take the exam and earn ECTS credits.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.875</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Students can earn their grade through continuous assessment by passing two midterm exams. A student has to achieve at least 50% of points to pass each midterm exam. In case a student has fulfilled all course obligations but has failed / missed the midterm tests, he/she has to take the final written test in the examination period.

It is mandatory that students attend 100% of exercise hours (practical training) and complete the seminar tasks (assigned to them at the beginning of the semester). A seminar task is considered as successfully completed if it earns at least 70% points. The seminar tasks are assessed separately. One seminar task (selected by the student group) requires a PowerPoint presentation at the end of the semester.

The final grade comprises the class attendance, results of the midterm tests / final exam, and the assessment of the individual / team tasks.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Midterm test I</td><td>50</td><td>40</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>40</td></tr>
<tr><td>Seminar paper</td><td>70</td><td>20</td></tr>
</table>

Grading

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Grading and continuous assessment of part-time students:
Part-time students are required to attend at least 50% of lectures, 100% of practical training / exercises, and 100% of laboratory exercises / field work. The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td>
<table>
<tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td>Gabrić, S. Šitić. Materijali II. University of Split, 2015.</td><td></td><td></td></tr>
<tr><td>W. D. Callister, Jr., D. G. Rethwisch. Materials Science and Engineering – an Introduction, John Wiley & Sons, Inc., 2018.</td><td></td><td></td></tr>
<tr><td>G. Krauss. Steels, Processing, Structure, and Performance. ASM International, 2005.</td><td></td><td></td></tr>
<tr><td>R. Reuben. Materials in Marine Technology. Springer-Verlag, 1994.</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>
1. Z. Kulenović, N. Vulić. Elementi brodskih strojeva i pomorskih konstrukcija. University of Split, 2020.
2. Gabrić, S. Šitić. Materijali I. University of Split, 2012.
3. Duplančić, N. Krnić. Materijali 3, Zavod za strojarsku tehnologiju. University of Split – Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2009.
4. B. L. Bramfitt, A. O. Benscoter. Metallographer´s Guide – Practices and Procedures for Iron and Steels, ASM International, 2002.
5. M. P. Groover. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, John Wiley & Sons, Inc., 2019.
6. M. F. Ashby. Materials Selection in Mechanical Design, 4th Ed. Elsevier, 2011.
7. Heat Treater's Guide: Practices and Procedures for Irons and Steels, 2nd Edition ASM Publ., 1995.
8. James F. Shackelford. Introduction to Materials Science for Engineers. 2015.
9. M. Mcguire. Stainless Steels for Design Engineers. ASM International, 2008.
10. ASM Handbook, Properties and Selection: Nonferrous Alloys and Special-Purpose Materials, v. 2, 10th Ed., USA, 1990.
11. ASM Handbook, Metallograpy and Microstructures. v. 9, 1990.
12. ASM Handbook, Heat Treating, v. 4, 1990.
13. ASM Handbook, Alloy Phase Diagram, v. 3, 1990.
14. ASM Handbook: Materials Selection and Design. v. 20, 1990.
</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td>In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.</td></tr>
</table>

	Due to practical classes requirements, the courses are optimized for groups of maximum 18 students. Practical classes are held corresponding to the work time-table of the teacher and/or the assistant in charge of the laboratory.

NAME OF THE COURSE	COMPLEX MACHINERY IN EXPLOITATION TECHNOLOGIES					
Code	PFS228	Year of study	2			
Course teacher	Joško Dvornik, PhD, full professor with tenure	Credits (ECTS)	4			
Associate teachers	Srđan Dvornik, MEng	Type of instruction (number of hours)	L	S	E	F
			30		15	
Status of the course	Elective	Percentage of application of e-learning				
COURSE DESCRIPTION						
Course objectives	Familiarisation with the complex and inter-disciplinary features of individual some branches of the marine technology. Enabling the students to participate in teamwork for planning, energy-propulsion support and logistics.					
Course enrolment requirements and entry competences required for the course	No requirements.					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	1. Select suitable technology of exploring and exploitation of oil, gas and minerals. 2. Classify the design and technological features of the vessels for laying cables and pipelines, dredgers and heavy-lift vessels. 3. Evaluate the diving technologies and using devices in very deep waters. 4. Distinguish and apply the procedures for acquiring food and water from the sea, desalination process, desalination plants, osmosis, reverse osmosis, membrane process and experimental techniques, as well as technologies of fishing and fish farming. Recognise the problems of overharvesting and by-catch. 5. Assess the possibility of extracting energy from the sea. 6. Create and assess the environment safety systems. Assess the pollution and harmful effects of marine technology.					
Course content broken down in detail by weekly class schedule (syllabus)	**Lectures:** 1. Marine resources: hydrological, mineral, biological (marine mining, manganese nodules, methods of collecting/extracting ores from the seabed, loose sediments, animal and plant organisms). 2. Technologies of exploration and exploitation of oil, gas and minerals (mobile and stationary platforms, floating, semi-submersible, self-elevating platforms, productive an, exploration platforms). 3. Design and technological features of the off-shore rigs (construction, stability, energy drive-propulsion complex, devices for anchoring, raising and lowering objects). 4. Technology of acquiring food and water from the sea (desalination, desalination plants, osmosis, reverse osmosis, membrane processes, experimental techniques). 5. Technology of extracting energy from the sea (waves, tides, coastal / offshore / inshore structures). 6. Mobile and stationary facilities for the research and exploration of the seabed and subsoil. 7. Design and technological features of the ships for laying cables and pipelines across the seabed. 8. Design and technological features of the dredgers. 9. Technologies used for retrieving and lifting the vessels and object from the sea bottom (submarines, LP submarines, bathyscaphe, rigid spacesuit, JIM, WASP, robots, floating cranes).					

<table>
<tr><td></td><td colspan="2">10. Technology of diving and using devices in deep waters (diving technology, fundamentals of diving physics, diving apparatus, devices and auxiliary equipment for diving, saturation diving, diving technique, diving logistics).
11. Underwater detecting devices and equipment (sonars, underwater television, underwater communication).
12. Electric power plants at sea (hydro-electric plants using tides and waves, wind farms at sea).
13. Marine accommodation. Artificial islands.
14. Environment protection from pollution and harmful effects of marine technologies (chemical, thermal, threats from heavy metals, shore-based industry). International regulations governing the marine environment protection.
15. Fishing and fish farming (technologies of fishing and fish farming, catch and processing vessels, problems of overharvesting and by-catch, protection of marine life resources and environment).

Exercises:

1. Technologies of exploration and exploitation of oil, gas and minerals.
2. Design and technological features of the off-shore rigs.
3. Technology of acquiring food and water from the sea.
4. Design and technological features of the ships for laying cables and pipelines across the seabed.
5. Design and technological features of the dredgers.
6. Technology of diving and using devices in deep waters.
7. Transport and towing.
8. Electric power plants at sea.
9. Research ships. Underwater accommodation and laboratories.
10. Artificial islands – study of the project The World.
11. Technologies used for retrieving and lifting the vessels and objects from the sea bottom.
12. Facilities for the research and exploration of the seabed and subsoil.
13. Heavy-lift ships – types and design principles.
14. Underwater detecting devices and equipment.
15. Fish-processing vessels.</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td>☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required to attend at least 80% of lectures and 80% of exercises in order to take the exam and earn ECTS credits.
Insufficient attendance (excused absence up to 20%) has to be compensated by performing additional tasks, i.e. additional individual workload. Students who have missed classes due to illness must have a valid medical document proving their health issues.
Students who have achieved less than 80% of class attendance cannot apply for the exam and have to re-register the course in the following academic year.
Students can pass the exam by taking 2 midterm tests. Only one midterm, failed or missed, can be re-taken.
Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final written and oral exam in the examination period.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">The student who has passed the midterm exams and has performed the project assignment is expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade. Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td>Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td colspan="6"><table>
<tr><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.375</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam (alternative to midterm tests)</td><td>2.5</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are two midterm exams in the semester. The first comprises Learning outcomes 1-5 and is held in the 8th week, while the second midterm test comprises Learning outcomes 5-7 and is held in the 14th week of the semester. Examples of the tests and exam questions are available at Merlin e-learning platform.
A student has to achieve at least 50% of points to pass a midterm exam. Students who have missed or failed one of the midterm tests are allowed to re-take that test. The final grade comprises the class attendance, evaluation of the seminar paper, results of the midterm tests / final written test, and the result of the oral examination. Students who have fulfilled all course obligations but have not managed to pass the midterm test, have to take the final written exam in the examination period. The same evaluation criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>28.12</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>12.5</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>29.69</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>29.69</td></tr>
</table>
Grading

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
Grading and continuous assessment of part-time students:</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">Part-time students are required at least 50% of class attendance, otherwise they cannot apply for the exam. The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="9">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>I. Brkić: Buka u moru i oceanima, FER, Zagreb, 2004.</td><td></td><td></td></tr>
<tr><td>B. Labudović: Obnovljivi izvori energije, Zagreb 2002.</td><td></td><td></td></tr>
<tr><td>D. Evans, N. M. Dicken: Doppler Ultrasound, John Wiley & Sons, Chichester, 2001.</td><td></td><td></td></tr>
<tr><td>S. Gošović: Ronjenje u sigurnosti, 4th edition, Jumena, Zagreb, 1986.</td><td></td><td></td></tr>
<tr><td>S. Gošović: Priručnik za profesionalna i vojna ronjenja, Graf form, Split, 1997.</td><td></td><td></td></tr>
<tr><td>S. Gošović: Safe diving, Best publishing company, Flagstaf, USA, 1993.</td><td></td><td></td></tr>
<tr><td>LJ. Majdandžić: Obnovljivi izvori energije, Zagreb, 2002.</td><td></td><td></td></tr>
<tr><td>Membrane and Desalination Technologies, Humana Press, 2011.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. V. Čorić: Numeričko modeliranje pomorskih sidrenih sustava pomorskih konstrukcija, FESB Zagreb, 1990.
2. Pomorska enciklopedija, Leksikografski zavod Miroslav Krleža, Knjiga VIII, Zagreb,1972-1989.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">RENEWABLE ENERGY SOURCES</td></tr>
<tr><td>Code</td><td>PFE312</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Maja Krčum, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Mario Miličević</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Acquisition of specific knowledge needed to solve practical problems of application of renewable energy technologies from the point of view of marine engineering.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Select renewable energy sources from the point of view of marine engineering.
2. Compare the use of renewables in maritime and in land-based technologies.
3. Assess energy efficiency by applying new technologies.
4. To substantiate selected renewable energy solutions applied in marine engineering.
5. Recommend renewables in view of their application in marine engineering.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction - EU energy efficiency and renewable energy policy and legislation. Share of renewables in EU energy consumption.
2. Energy Law of the Republic of Croatia. Economic and financial aspects of the implementation of the national energy programs of the Republic of Croatia. Recommendations for creating a supportive legislative environment.
3. IMO recommendations on energy efficiency and renewable energy applications
4. Energy production. Overview of renewable energy sources. Renewable energy principles. Integration of renewable energy technologies and the concept of self-sustainable development.
5. Biomass.
6. Biofuels.
7. Geothermal energy. Hydropower. Potential of small hydropower plants.
8. Wave energy. Tidal energy.
9. Wind energy.
10. Solar radiation. Conversion of solar energy into electricity (photovoltaic conversion). Solar photovoltaic systems.
11. Fuel cells and batteries.
12. Energy storage technologies: primary batteries, accumulators, supercapacitors, flywheels.
13. Cogeneration systems.
14. Integrated energy systems.
15. HOGA (Hybrid Optimizations by Genetic Algorithms) program conversion options.
Exercises:
1. Auditory exercise – overview of drafts and schemas.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">2. Auditory exercise – overview of drafts and schemas.
3. Auditory exercise – example of selecting renewable energy sources.
4. Auditory exercise – calculation.
5. Auditory exercise – calculation.
6. Auditory exercise – calculation.
7. Auditory exercise – example of selecting renewable energy sources.
8. Familiarisation with Hybrid Optimizations by Genetic Algorithms (HOGA) (or similar) program.
9. Familiarisation with HOGA (or similar) program.
10. Selection of parameters.
11. Selection of parameters.
12. Example of calculation – independent assignments.
13. Example of calculation – independent assignments.
14. Example of calculation – HOGA.
15. A visit to an energy plant – renewable sources (to be arranged with the receiving institutions agree on the time of visit.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☒ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time and part-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance in order to take the exam and earn ECTS credits. In case of justified absence, the students whose attendance in lectures and/or exercise amounts to 70% or more can compensate for absence from the class (up to 80%) in extra time, during or after the semester, but not later than two months upon the end of the course. Students with insufficient attendance (less than 70%) have to re-register the course in the following academic year.
The obligations of part-time students cannot be less than 50% with regard to full-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>Independent assignment</td><td>0.375</td></tr>
<tr><td>Midterm tests</td><td>1</td><td>Oral exam</td><td>1</td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. The first midterm exam comprises Lectures 1-7 and is held in the 7th week, while the second midterm test comprises Lectures 8-15 and is held in the 15th week of the semester.
One class hour is available for writing the midterm test.
Sample tests and exam questions are available on Merlin e-learning platform.
A student has to achieve at least 50% of the points to pass a midterm exam.
Over the semester the students create and present their seminar papers and independent assignments.
Students who fail or miss a midterm exam for justified reasons, can re-take the test.</td></tr>
</table>

Students who have passed both midterm tests and fulfilled the obligations related to the seminar work and the independent assignment are exempted from the oral part of the exam.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance, results of the midterm tests / final test, and the results of seminar papers and independent assignments.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	20
Seminar paper	100	10
Midterm test I	50	30
Midterm test II	50	30
Independent assignment	70	10

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
P. Kulišić: *Novi izvori energije - sunčana energija i energija vjetra*, Školska knjiga, Zagreb, 1991.		
V. Potočnik, V. Lay: *Obnovljivi izvori energije i zaštita okoliša u Hrvatskoj*, MZOPU, Zagreb, 2003.		
B. Labudović: *Obnovljivi izvor energije*, Energetika marketing, Zagreb, 2002.		

Optional literature (at the time of submission of study programme proposal)

1. Group of authors: *SUNEN - Program korištenja energije sunca*, En. institut Hrvoje Požar, Zagreb.
2. Group of authors: *ENWIND - Program korištenja energije vjetra*, En. institut Hrvoje Požar, Zagreb.
3. Group of authors: *BIOEN - Program korištenja energije biomase i otpada*, En. institut Hrvoje Požar, Zagreb
4. Group of authors: *MAHE - Program izgradnje malih hidroelektrana*, En. institut Hrvoje Požar, Zagreb.
5. Group of authors: *GEOEN - Program korištenja geotermalne energije*, En. institut Hrvoje Požar, Zagreb.
6. European Committee (2021). *Kohezijski paket za 2021– 2027*. Official Journal of the European Union, L 231, 30 June 2021. https://eur-lex.europa.eu/

Quality assurance methods that ensure the acquisition of exit competences	Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">INTERNSHIP</td></tr>
<tr><td>Code</td><td>PFS501</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Ladislav Stazić, PhD
Luka Vukić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Associate teacher</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>150</td></tr>
<tr><td>Status of the course</td><td>Elective</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Familiarising students with the business processes and developing their skills for solving practical problems in a real-life working environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">Students are entitled to apply for the Internship in a teaching base prior to the beginning of the third year of their undergraduate study program. Given the available capacities in the teaching bases, in the event of a large number of applications, the applicants shall be short-listed according to the Faculty's Regulations on Internship in Teaching Bases.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">General learning outcomes:
1. Apply the knowledge and skills acquired throughout the graduate study programme in solving concrete business problems in the real-life working environment.
2. Create a Report on the performed internship, with the description of 5-10 completed business tasks, supported by relevant documents.
Specific learning outcomes:
1. Determine and evaluate the marine engine components that have to meet the requirements on the safety at work and safety of the environment (statuary provisions) and the requirements on functionality (classification provisions).
2. Interpret and assess the elements of the maritime legal regulations on the boats, yachts, ships and offshore structures.
3. Anticipate the tasks of the fleet manager and ship superintendent.
4. Examine and evaluate the production, installing and testing of marine engine components on the basis of the approved technical documents; form remarks and follow how they are dealt with.
5. Assess the remarks of the shipowner on the newbuilding project prepared by the shipyard (technical description, general plan, list of suppliers) and assess the validity of remarks on the basis of the contracted technical description or previous enquiry about the machinery components and systems.
6. Arguing the opinion about the work of the expert team of the shipowners regarding the final and handover tests of the newbuilding by mechanical components and systems. Manage the complaints related to collaterals and warranty.
7. Recommend and create manuals specifying the engine crew tasks and the organisation of work on board.
8. Assess the need for overhauling / modification of a component, set, engine, device or other element of the ship machinery system.
9. Determine the specification of a project, monitor and control the project cost.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">10. Control the performance of the overhaul / modification and the final testing of a ship machinery component or system.
11. Assess and prepare the vessel for break-up. Anticipate the safe recycling of the vessel with regard to environmental protection in line with relevant conventions.
12. Manage the quality system for the safe operation of the vessel, security and environmental protection (Quality Management Systems in compliance with ISM, ISO 14001, OHSAS).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">The internship, i.e. professional practice, is carried out with the support of the teaching base mentor, through completing a number of specific work assignments. The duration of the internship is 19 working days (150 working hours). The teaching base mentor designs and plans all tasks, with the approval of the Faculty of Maritime Studies mentor. Upon completing the internship, students have to make a Report and defend it before the Faculty of Maritime Studies mentor.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">The students engaged in internship have to perform 135 working hours (17 working days), according to the time-table designed by the teaching base mentor. They have to follow the mentor's guidelines and carry out the assigned tasks. Upon completing the internship, students have to make a Report (15 working hours) and defend it before the mentor and fellow students of the Faculty of Maritime Studies in Split.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td>4.5</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Making a report on practice</td><td>0.3</td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>Defending the report on practice</td><td>0.2</td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The internship results are described by the Teaching Base and the Faculty of Maritime Studies mentors. The Teaching Base mentor continuously monitors the student attendance and commitment to solving the allocated tasks. Upon completing the internship, he/she defines one of the following descriptive assessments:
• The student has completed the internship successfully;
• The student has not completed the internship successfully.
The Teaching Base mentor's assessment “The student has not completed the internship successfully” has to be explained in writing. In this case, the Faculty of Maritime Studies mentor does not assess the Report on internship, but defines the final grade as “Insufficient – fail”.
If the Teaching Base mentor's assessment reads “The student has completed the internship successfully”, the Faculty of Maritime Studies mentor evaluates the</td></tr>
</table>

<table>
<tr><td></td><td>Report on internship, discusses the performed tasks with the student, and then defines one of the following descriptive assessments:
The student has successfully made and defended the Report on internship; or
The student has not successfully made and defended the Report on internship.
If the Faculty of Maritime Studies mentor's assessment reads “The student has not successfully made and defended the Report on internship”, his/her assessment has to be explained in writing.
The student is considered to have passed the course only if the descriptive assessments of both mentors confirm the successful realisation of the internship / Report on internship. In this case, the Faculty of Maritime Studies mentor enters the grade “Passed” in the student’s online service (“Studomat”).

Continuous assessment:<table><tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr><tr><td>Practical work</td><td>100</td><td>90</td></tr><tr><td>Making the report on internship</td><td>100</td><td>6</td></tr><tr><td>Defence of the report on internship</td><td>100</td><td>4</td></tr></table></td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td><table><tr><th>Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr><tr><td>The professional literature is defined by the Teaching Base mentor.</td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td>The professional literature is defined by the Teaching Base mentor.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td>Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MARINE PLANT OPTIMISATION</td></tr>
<tr><td>Code</td><td>PFS207</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Joško Dvornik, PhD, full professor with tenure</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Srđan Dvornik, MEng</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td colspan="2">F</td></tr>
<tr><td>30</td><td></td><td>15</td><td colspan="2"></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">10%</td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Assessing the various types of marine propulsion. Familiarisation with the principles of the optimum use of the ship’s propulsion.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1. Classify the essential parameters of the marine propulsion.
2. Analyse and anticipate the thermos-energy parameters of the marine propulsion system.
3. Evaluate various marine propulsion types with regard to the energy, safety and ecology parameters.
4. Assess with arguments the optimal operation of the marine propulsion and its compliance with IMO regulations.
5. Suggest procedures for the optimisation of the marine propulsion system.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Lectures:
1. Characteristics of the modern marine propulsion systems.
2. Thermo-energy systems and their technological processes from the viewpoint of control and optimisation.
3. Identification of the parameters of the marine propulsion diesel engine.
4. Analysis of the diesel engine operation.
5. Diesel engine drive and its optimal operation check.
6. Marine steam turbines, turbo-electric propulsion.
7. Development of the gas-turbine plant. Gas turbine fuels.
8. Technological processes and optimal operation.
9. Diesel-electric drive. Combined plants.
10. Elaboration of the systems with regard to maintenance, ecology and safety.
11. IMO regulations and requirements on the optimisation of the marine propulsion.
12. Energy analysis of the marine propulsion systems.
13. Comparison of the propulsion systems with regard to energy, safety, ecology and maintenance.
14. Optimal use of energy resources for ship propulsion.
15. Advanced technologies and expert systems introduced to the marine propulsion systems, aimed at the optimisation of operation.
Exercises:
1. Examples of modern marine propulsion systems.
2. Examples of modern energy systems.
3. Examples of the optimisation of parameters of the ship’s propulsion system.
4. Examples of the optimisation of heat process segments.
5. Examples of new technological solutions for steam-gas plants.
6. Analysis of marine diesel engine operation.
7. Examples of technological solutions in diesel engines.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">8. Optimisation of the working processes – examples – engine room simulator.
9. Analysis of the energy saving systems examples – engine room simulator.
10. Analysis of the engine propulsion systems.
11. Analysis of the electric propulsion systems.
12. Analysis of the turbine propulsion systems.
13. Elaboration of the systems with regard to maintenance, ecology and safety.
14. Examples of the optimal use of energy resources.
15. Considering new technologies for using energy sources.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required to attend at least 80% of lectures, auditory and laboratory exercises, in order to take the exam and earn ECTS credits. Students are assigned tasks to be carried out through individual or team work, using the e-learning material. In addition, students have to create and present a seminar paper, according to the course teacher's guidelines.
Students with insufficient attendance have to re-register the course in the following academic year.

Obligations of part-time students:

Part-time students are required at least 50% of class attendance in lectures and exercise. Students have to perform independent assignments; in addition, they have to create and present seminar papers, according to the course teacher's guidelines.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>2.375</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as two midterms. There are two midterm exams in the semester – in the 7th and the 15th week of the semester. The latter comprises theoretical questions.
Sample tests are available on Merlin e-learning platform.
A student has to achieve at least 50% of the points to pass a midterm exam.
In case a student has fulfilled all course obligations but has failed the midterm tests, he/she has to take the final written test in the examination period.
The final grade comprises the class attendance and results of the midterm tests.
The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment of students:</td></tr>
</table>

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	28.12
Seminar paper	100	12.5
Midterm I	50	29.69
Midterm II	50	29.69

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:

Part-time students are required at least 50% of class attendance in lectures and exercise. The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
G. Radica: *Optimizacija brodskog pogona*, script, University of Split – Faculty of Maritime Studies, Split, 2012.		Yes
G. Radica: *Expert System for Diagnosis and Optimisation of Marine Diesel Engines*, Strojarstvo, Zagreb, 2008.		Yes
S. S. Rao: *Engineering Optimization*, John Wiley & Sons, Inc., Hoboken, New Jersey, 2009.		
Marine Engineering, The society of Naval Architects and Marine Engineers, 601 Pavonia Avenue, Jersey City, N. J. 1992.		
S. H. Henshall: *Medium and High Speed Diesel Engines for Marine Use*, The Institut of Marine Engineers, London, 1996.		
J. Cowley: *The running and Maintenance of Marine Machinery*, The Institut of Marine Engineers, London, 1994.		
Lectures on Merlin e-learning platform.		

Optional literature (at the time of submission of study programme proposal)

1. Woodward, J. B., *Marine gas turbines*, A Wiley-Interscience Publication, Canada 1975.
2. Group of authors, *New Marine Engineering*, Volume I, II, London, 2000.
3. Haynes, W. E., *Marine Engineering Workbook*, Volume I, II, III, MMA, 1999.
4. Vučina Damir: *Metode numeričkog optimiranja*, University coursebook, 2012

Quality assurance methods that ensure the

Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the

acquisition of exit competences	examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">MODELLING AND SIMULATION OF SHIP SYSTEMS</td></tr>
<tr><td>Code</td><td>PFS237</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Nenad Vulić, PhD, full professor with tenure</td><td>Credits (ECTS)</td><td colspan="4">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Liane Roldo, PhD, full professor
Karlo Bratić, PhD</td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>45</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">In-depth insights into the construction, design, dimensions, materials and loads of the marine propulsion systems through the application of computer programmes for analytic solutions and simulation of loads, stresses, deformations, acceptable criteria and their assessment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously registered course in “Marine propulsion system”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Confirm the practical problem solution through MS Excel and Visual Basic for Applications (VBA).
2. Propose system design parameters (propulsion system components, select their structural form and material, determine operating load, choose dimensions, determine the response of individual components - displacements, deformations, forces, stresses) using ready-made or own computer programs.
3. Determine clear criteria of acceptability.
4. Support the decision making system through specialised software.
5. Evaluate the acceptability of the solution (verification and validation).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures (45 h):
1. (1 h) Introduction to the course: contents of lectures and exercises, exam guidelines.
2. (2 h) Theoretical fundamentals of modelling and simulation. Theory of systems.
3. (3 h) Cybernetics and simulation.
4. (3 h) Modelling, models and computer simulation.
5. (6 h) Modeling and simulation of longitudinal vibrations of a mechanical system with 1 degree of freedom: Basics of using MS Excel with named variables.
6. (3 h) Modeling and simulation of vibrations of a mechanical system with 2 degrees of freedom: Real system, model and its simulation. Free undamped vibrations. Forced damped vibrations. Torsional vibrations of a system with two degrees of freedom. Computer simulation of the model. Application of matrix functions in MS Excel.
7. (6 h) Modeling and simulation of geometry, stress and safety of cylindrical gears: Real system, model and its simulation. Gear geometry modeling. Load capacity of gear pairs. Tooth load. Standards, rules and regulations. Tooth root loading. The load on the flanks of the teeth. Simulation of the model on the computer (program S10CylGears_IACS). Introduction to VBA (Visual Basic for Applications) and application of Function type subprograms.
8. (6 h) Modeling and simulating the crankshaft of a marine diesel engine: Real system, model and its simulation. Kinematics and dynamics of the reciprocating mechanism. Crankshaft load. Internal forces, nominal</td></tr>
</table>

	stresses and their ranges. Stress concentration factors. Equivalent and permissible stresses. Safety against fatigue in the transitions of the connecting rod journals and the main bearing journals. Safety against fatigue at the exit of the bore for lubrication of the connecting rod journal. Simulation of the model on the computer (program S02CrankL_IACS). Application of subprograms of type Sub within VBA and embedding of macro commands in MS Excel. 9. (9 h) Modeling and simulation of shaft line torsional vibrations using SimulationX: Real system, model and its simulation. Torsional vibrations of systems with 1 degree of freedom and with *n* degrees of freedom. Torsional vibrations of the ship shaft line. Elements of the simulation model. Damping of the spring-damping element. Absolute damping element. Special absolute damping element. Absolute damping of the ship screw. Modeling of propulsion engine cylinders. Special elements in the *SimulationX* program. Modeling of engine cylinder excitation. Examples of *SimulationX* calculations of torsional vibrations. Validation of calculations by measurement on board. 10. (6h) Modeling and simulation of static response during shaft line alignment: Real system, calculation model and its computer simulation. Preparation of data for the calculation. Calculation cases. The process of modeling the shaft line. Elements of the calculation model. Method selection and calculation implementation. Method of transfer matrices. Selection of initial parameters. Calculation of influential coefficients. Initial reactions of journals (for zero displacements). Journal reactions for selected bearing displacements. Acceptability criteria and their verification. Validation of alignment by on-board measurement. An example of a simulation model based on the educational program *MDSolids*. **Exercise, part 1 (20 h):** 1. (2 h) Basic features of MS Excel. 2. (2 h) Defining, applying and managing the named variables in MS Excel. 3. (2 h) Application of special analytical functions in MS Excel (e.g. *Atan2*). 4. (2 h) Application of *WhatIf* analysis and optimization functions (*GoalSeek*). 5. (2 h) Drawing diagrams in MS Excel. 6. (2 h) Fundamentals of VBA (*Visual Basic for Applications*). 7. (2 h) Application of function subprograms in VBA and examples of using VBA Function subprograms. 8. (2 h) Installation of additional macro commands in MS Excel and examples of using VBA Sub subprograms. 9. (2 h) Basics of the *SimulationX* software package and its use in modeling and simulating simpler mechanical systems. 10. (2 h) Advanced use of the SimulationX software package in modeling and simulating complex mechanical vibration systems. **Exercise, part 2 (10 h):** 1. (2 h) Simulation modeling in the technological process of casting. 2. (2 h) Simulation modeling in technological procedures of deformation processing. 3. (2 h) Simulation modeling in the technological procedures of welding. 4. (4 h) A visit to a production organization and familiarization with the application of simulation modeling which is performed there (field work). **Seminar work:** Solving specific practical tasks related to simulation modeling in ship systems with selected computer programs (MS Excel without VBA, MS Excel with VBA, SimulationX, MDSolids).	
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety	☒ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor

<table>
<tr><td></td><td>☐ partial e-learning
☒ field work</td><td>☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required to attend at least 80% of lectures and 80% exercises, in order to take the exam and earn ECTS credits.
Students with insufficient attendance have to re-register the course in the following academic year. Students have to create and present program assignments and seminar papers, according to the course teacher's guidelines.

Obligations of part-time students:

Part-time students are required at least 50% of class attendance in lectures and exercise. Students have to create and present program assignments and seminar papers, according to the course teacher's guidelines.</td></tr>
<tr><td>Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td colspan="2">
<table>
<tr><td>Class attendance</td><td>1.875</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>E-learning</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.9375</td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td>2.1875</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table>
</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="2">Assessment and grading of full-time students:

There are no midterm exams. The final grade comprises the results of the assigned program tasks (performed individually or in a team) and the performance on the final test in the examination period.

Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Class attendance</td><td>80</td><td>0</td></tr>
<tr><td>Program task 1</td><td>50</td><td>15</td></tr>
<tr><td>Program task 2</td><td>50</td><td>15</td></tr>
<tr><td>Written test</td><td>50</td><td>70</td></tr>
</table>
Grading
<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-49</td><td>Performance does not meet the minimum criteria</td><td>Insufficient - fail (1)</td></tr>
<tr><td>50-64</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>65-79</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>80-89</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>90-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
Grading and continuous assessment of part-time students:</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">Part-time students are required to attend at least 50% of lectures and exercise in order to take the exam. The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Rules for the Classification of Ships, Part 7 - Machinery installation // Pravila za klasifikaciju brodova, Dio 7. – Strojni uređaj. Croatian Register of Shipping, Split, 2008.</td><td></td><td>No</td></tr>
<tr><td>Rules for the Classification of Ships, Part 9 – Machines // Pravila za klasifikaciju brodova, Dio 9. – Strojevi. Croatian Register of Shipping, Split, 2008.</td><td></td><td>No</td></tr>
<tr><td>Templates for the use of specialized computer programs.</td><td></td><td>No</td></tr>
<tr><td>J. Marasović, Kvantitativno i kvalitativno modeliranje i simuliranje, University of Split – Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2004.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. Rules for the Classification of Ships, Part 7 - Machinery installation, Croatian Register of Shipping, Split, 2013.
2. Rules for the Classification of Ships, Part 9 - Machines, Croatian Register of Shipping, Split, 2014.
3. SimulationX – User’s Manual.
4. SimulationX – Library Manual.
5. VDI 4465:2021-07 Modelling and simulation - Building the model, Verein Deutscher Ingenieure e.V., Düsseldorf, 2021.
6. S. Raczynski, Modeling and Simulation: The Computer Science of Illusion, John Wiley & Sons, Ltd, Chichester, 2006.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="3">Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="3"></td></tr>
</table>

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="6">BUSINESS SYSTEMS</th></tr>
<tr><td>Code</td><td>PFP310</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Mario Filipović, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>30</td><td></td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5">10%</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Creating new values by starting and development of new companies and creating jobs. Enabling the detection of opportunities for running the business, innovations, investments, spreading to new markets, developing new products and production techniques. Familiarising with business systems and acquiring essential skills for starting a business career.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Provide arguments and critical opinion on the effects of various factors on the success of business venture.
2. Evaluate the project documents.
3. Critically assess the capacity and reliability of the investor.
4. Suggest a calculation of the business plan.
5. Recommend the business planning procedure.
6. Provide arguments and opinions on the analysis of the market and competition.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the course. Notion of entrepreneurship.
2. Historical development. Theoretical approach to entrepreneurship.
3. Individual and corporative entrepreneurship.
4. Entrepreneur: definition, features, types, motivations, sources, models.
5. Functions of entrepreneurship: strategic, organisational, management control.
6. Starting a new business. Acquisition Franchising.
7. Business environment: free market, market economy.
8. Legal forms of business in Croatia.
9. Women in business. Young businesspersons.
10. Business infrastructure.
11. Business process.
12. Provision and management of supplies, marketing and sales.
13. Financing and business results.
14. Characteristics of a 21st century entrepreneur. Future of entrepreneurship.
15. New trends in the economy and entrepreneurship. Virtual entrepreneurship.
Exercises:
1. Business plan – why does a company need it?
2. Business plan procedure.
3. Market analysis and competition.
4. Assessment of the strategic position and risk.
5. Financial indicators.
6. Types of calculation in business planning.
7. Importance of the business plan for the company growth.
8. Impact of various factors on the success of business venture.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">9. Basic theories of costs.
10. Types of costs.
11. Example of an elaborate investment.
12. Project content.
13. Investor data.
14. Financial elements of the investment.
15. Evaluation of the project.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="3">☒ independent assignments
☒ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. Full-time students are required at least 80% of class attendance (lectures and exercise) in order to take the exam and earn ECTS credits. Students with insufficient attendance have to re-register the course in the following academic year.
Students can pass the exam by taking 1 midterm test and 1 seminar paper (that has to be presented) during the semester.
Students are assigned tasks to be carried out through individual or team work, using the e-learning material.
Students who have fulfilled all course obligations but have failed or missed one of the midterms have to register for the final exam in the examination period.
The student who has passed all the midterm exams is expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade.
Students shall take the final oral exam in case they would like to achieve a higher grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same assessment criteria, grading and ways of taking midterms / final exam apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>E-learning</td><td>0.25</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.25</td><td>Auditory exercise</td><td>0.25</td></tr>
<tr><td>Midterm tests</td><td>1.125</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Assessment and grading of full-time students:

Active participation in class is encouraged and monitored throughout the semester. The written test can be taken as a complete test in the examination period or as one midterm test + one seminar paper. The first version of the midterm test comprises Lectures 1-8 and is held in the 8th week, while the second version of the midterm test comprises Lectures 9-15 and is held in the 15th week of the semester.
A student has to achieve at least 50% of points to pass a midterm exam.
Students who fail or miss a midterm exam for justified reasons, has to create and present a seminar paper dealing with the matter covered by the failed / missed midterm test.</td></tr>
</table>

Students have to carry out the studies on the assigned topics and issues, through individual or team work, using the e-learning material.
The final grade comprises the class attendance, result of the midterm test, seminar paper and individual/team assignments. In case a student has fulfilled all course obligations but has failed the midterm test, he/she has to take the final written test in the examination period. The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	37.5
Auditory exercises	80	8.33
Seminar paper	100	8.33
E-learning	100	8.33
Midterm test	50	37.5

Grading

Points (%)	Criterion	Grade
0-49	Performance does not meet the minimum criteria	Insufficient - fail (1)
50-64	Performance meets the minimum criteria	Sufficient (2)
65-79	Generally sound work, with a number of notable errors	Good (3)
80-89	Performance above the average standard, with some errors	Very good (4)
90-100	Outstanding performance	Excellent (5)

Grading and continuous assessment of part-time students:
Part-time students are required at least 50% of class attendance in lectures. The same grading and evaluation criteria apply to both full-time and part-time students.

Required literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
M. Buble, D. Kružić: *Poduzetništvo*, RRiF, Split, 2006.		
M. Kolaković: *Poduzetništvo u ekonomiji znanja*, Sinergija, Zagreb, 2006.		

Optional literature (at the time of submission of study programme proposal)

1. I. Vujević: *Poduzetništvo*, University of Split, 2004.
2. M. Cingula: *Kako izraditi poslovni plan i investicijski elaborat*, RRiF, Zagreb, 2001.
3. H. B. David Jr.: *Kako napraviti poslovni plan*, Jakubin & Son, Zagreb, 1995.
4. D. Hisrich, M. Peters, D. Shepherd: *Poduzetništvo*, McGraw – Hill / Irwin, translated by MATE, Zagreb, 2011.

Quality assurance methods that ensure the acquisition of exit competences

Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher's self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).

Other (as the proposer wishes to add)

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">PROJECT</td></tr>
<tr><td>Code</td><td>PFS238</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Liane Roldo, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teacher</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td colspan="2">F</td></tr>
<tr><td>0</td><td>0</td><td>75</td><td colspan="2">0</td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="5"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Familiarising students with the business processes and developing their skills for solving practical problems in a real-life working environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7"></td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1. Apply the knowledge and skills acquired throughout the graduate study programme in solving concrete business problems in the real-life working environment.
2. Interpret and assess the elements of the maritime legal regulations on the boats, yachts, ships and offshore structures.
3. Examine and evaluate the production, installing and testing of marine engine components on the basis of the approved technical documents, make remarks and follow their implementation.
4. Determine the project specification and costs; monitor and control the project costs.
5. Assess the need and for overhauling / modification of a component, set, engine, device or other element of the ship machinery system.
6. Assess and prepare the vessel for break-up. Anticipate the safe ship recycling in line with the environment protection conventions..
7. Establish the quality system tools for the safe operation of the vessel, security and environmental protection (Quality Management Systems in compliance with ISM, ISO 14001, OHSAS).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Practical or simulation tasks are assigned to students by the advisor. Each student perform his / her task independently but following the guidelines and instructions of the mentor/advisor. The student performs analyses and suggests solutions. Upon the advisor’s approval, he/she creates and elaborate study supported by necessary technical documentation. On completing the assigned study, in the last week of the semester, the student presents the elaborate study before the mentor/advisor and fellow students.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="4">☒ independent assignments
☐ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="7">Student's duty is to follow the guidelines and instructions of his/her mentor/advisor and to perform the assigned tasks. On completing the elaborate study, the student has to present it before the mentor/advisor and fellow students.</td></tr>
</table>

<table>
<tr><td rowspan="6">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td></td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Consultation with the mentor</td><td>0.5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Data collection</td><td>0.5</td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>Performance of the elaborate study</td><td>0.5</td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td>3.0</td><td>Presentation of the elaborate study</td><td>0.5</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">The quality of the conducted study is assessed: the scope, structure, data research, selection and relevance of the sources, preparation, analysis, semantics of problem solving. The presentation of the study before the teacher / advisor and fellow students makes part of the final grade as well.
Continuous assessment:
<table>
<tr><th>Elements of assessment</th><th>Performance (min.%)</th><th>Participation in the final grade (%)</th></tr>
<tr><td>Consultations with the advisor</td><td>100</td><td>10</td></tr>
<tr><td>Data research</td><td>100</td><td>10</td></tr>
<tr><td>Creation of the elaborate study</td><td>100</td><td>10</td></tr>
<tr><td>Presentation of the elaborate study</td><td>100</td><td>10</td></tr>
<tr><td>Project</td><td>100</td><td>60</td></tr>
</table>
While evaluating the conducted study, the mentor may seek advice from other teachers.</td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td colspan="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td></td><td colspan="3"></td><td></td><td></td></tr>
<tr><td></td><td colspan="3"></td><td></td><td></td></tr>
<tr><td></td><td colspan="3"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="6">As recommended by the advisor. Independent use of publications that are freely available at the Faculty of Maritime Studies in Split.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="6">Survey carried out by University of Split, List of student attendance, Teaching process monitoring by Faculty, Teacher’s self-evaluation, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="6"></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">MASTER THESIS</td></tr>
<tr><td>Code</td><td>PFS500</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Appointed course teacher</td><td>Credits (ECTS)</td><td colspan="4">15</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td>F</td></tr>
<tr><td>0</td><td>0</td><td>30</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Compulsory</td><td>Percentage of application of e-learning</td><td colspan="4"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6"></td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">All registered courses within the student's curriculum have to be taken, attended and all respective exams passed.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Classify and assess the engine components on board ship, which have to comply with the environment safety and protection requirements (statutory components) and the functional requirements (classification components).
2. Identify, interpret and assess the elements of the maritime legal regulations on the boats, yachts, ships and offshore structures.
3. Organise the fleet manager’s and the ship superintendent’s tasks and perform the inspection of the vessels.
4. Estimate and evaluate the production, installing and testing of the onboard machinery components, on the basis of the approved technical documents, make comments and recommendations and follow up their implementation.
5. Assess the remarks of the investor regarding the newbuilding project that has been designed by the shipyard (technical description, general plan and list of suppliers), and establish whether these remarks are justified with regard to the contracted technical description of the commissioned machinery components and systems.
6. Provide professional opinion, supported by substantial arguments, when participating in the work of the shipowner’s expert team that performs final and delivery testing of the newbuilding’s engine components and systems; manage the complaints related to collaterals and warranty.
7. Recommend and create ship’s manuals referring to the engineering staff duties and the organisation of work on board.
8. Assess the need for overhauling / modification of a component, set, engine, device or other element of the ship machinery system.
9. Define the specification of a project, monitor and control the project cost.
10. Control the performance of the overhaul / modification and the final testing of a ship machinery component or system.
11. Evaluate and prepare the ship for breaking (anticipate the safe ship recycling ensuring the environment safety in line with the international conventions.
12. Manage the quality assurance control aimed at safe ship management, security, occupational safety and environmental preservation (Quality Management Systems in compliance with ISM, ISO 14001, OHSAS).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">n/a</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning</td><td colspan="3">☒ independent assignments
☒ multimedia
☐ laboratory
☒ work with mentor
☐ (other)</td></tr>
</table>

	☐ field work	

Student responsibilities	The master's thesis should show understanding, reflection, maturity and analytical ability of the student to apply the knowledge and skills acquired during his/her graduate study programme. The thesis work should identify a specific problem within the field of the study, analyse and treat the problem in a scientific manner. The thesis need not be a genuine scientific paper but the student should use scientific tools and methods independently, with the aid and under the supervision of the advisor. The student commits to report to the advisor on his/her work progress regularly, from the initial concept to the final draft of the thesis. The supervisor commits to encourage the student to stay in touch and provide updates on the thesis work. The supervisor will direct the student in the design of the Master's thesis and provide academic and methodical feedback on the work. This includes attention to research ethics, methodology and other relevant ethical and legal issues, including good research practice. The supervision must follow the student through all the elements of the learning objectives. The student should be familiarised with available information about plagiarism. The student is responsible for registering for the Master's degree. The advisor is responsible for approving the thesis before it is submitted for defence.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*						
	Class attendance		Research		Practical training	
	Experimental work		Report		Research	6.125
	Essay		Seminar essay		Creation of the Master Thesis	6.875
	Tests		Oral exam		Defence of the Master Thesis	2
	Written exam		Project		(Other)	

Grading and evaluating student work in class and at the final exam	The evaluation and grading of the student's Master Thesis is performed upon completion of the thesis and its defence before the Master Thesis Defence Committee, consisting of the student's Advisor and two other committee members.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	As agreed with the advisor.		

Optional literature (at the time of submission of study programme proposal)	Literature and other sources are selected in line with the Master Thesis topic and the respective course(s), as agreed with the student's Advisor.
Quality assurance methods that ensure the acquisition of exit competences	Teaching process monitoring performed by the Faculty, Analysis of the examination passing rate, External evaluation of the student assessment process (Quality Management System in compliance with ISO 9001).
Other (as the proposer wishes to add)	The bachelor thesis can be created and defended in English language, with the consent of the candidate's Advisor and the Head of the study programme.