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 undergraduate study programme in MARINE ENGINEERING

SPLIT, 2025

GENERAL INFORMATION ABOUT THE HIGHER EDUCATION INSTITUTION

Name of the 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.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	No co-providers.		
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	Bachelor (baccalaureus/baccalaurea) of Science in Marine Engineering (univ. bacc. ing. nav. mech.)		

1. INTRODUCTION

1.1. Reasons for starting 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. The global merchant fleet lacks marine engineers and Croatian seafarers have always been appreciated and in demand.

Basic objectives of the Marine Engineering study programme include:

- 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),
- 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,
- Life-long learning (continuous training) according to the principles of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW 1978/95): mobility and worldwide comparability of the study programmes, teaching staff and students, in addition to the requalification programmes in compliance with the EU METNET project.

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 reflected in the outstanding permeation of the scientific and professional work.

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

From the standpoint of the purpose assessment 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 maintain and operate modern vessels as complex technical and technological

systems, and are 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

As for defining the learning outcomes, the main goals are harmonised with the requirements of the *Standards of Training, Certification and Watchkeeping Convention* (STCW 78/95) and the national *Regulation on Requirements for the Award of Ranks and Certification of Seafarers*, which specify the requirements for the Chief Engineer on ships powered by the main propulsion machinery of 3000 kW or more. In addition, the executive curriculum entirely comprises the contents recommended by the International Maritime Organization (IMO).
The study programme has been re-certified by the European Maritime Safety Agency (EMSA).
After the evaluation of the undergraduate study programmes, the Faculty of Maritime Studies in Split has been certified by the Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT), allowing the degrees and competences acquired at the Faculty to be recognised on board ships and in companies under the jurisdiction of the Japanese Maritime Authority and the Japanese Shipowner Association, which enables direct employment of the students on board Japanese merchant vessels, without further examination or certificates of competence.
Every 5 years, the undergraduate study programme of Marine Engineering is evaluated by the Croatia's Ministry of the Sea, Transport and Infrastructure, after which the Accreditation for performing the university undergraduate study is issued.

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

External partners that express interest in the undergraduate study programme in Marine Engineering include national and foreign shippers (Jadroplov d.d., NYK, Shell, Royal Caribbean Cruise Line, Princess Cruise Line), maritime training and crewing agencies, and other companies engaged in marine industries (shipyards, overhaul providers, etc.).

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 programmes at the Faculty of Maritime Studies in Split, close attention was paid to the harmonisation of the programmes and courses with those developed by other respectable foreign institutions, in order to achieve their compatibility and comparability.
The correspondence of the curriculum and syllabi of the Marine Engineering undergraduate study programme 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 across the world, particularly in the European Union, has indicated a high level of comparability of study programmes with the following institutions:

- Cork Institute of Technology, Ireland (link: https://www.cit.ie/course/CR095)
- Faculty of Maritime Studies, University of Rijeka, Croatia (link: https://www.pfri.uniri.hr/web/hr/studij_pre_BS.php)

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 faculties 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 between 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

Undergraduate university study programme in Marine Engineering fully conforms to the mission and strategy of the Faculty of Maritime Studies in Split and to the Strategy of the University of Split 2021-2025 (Mission, vision and strategic guidelines).

1.9. Current experiences in equivalent or similar study programmes

The present Marine Engineering undergraduate study programme is the successor to the four-year Marine Engineering undergraduate programme that used to be performed at the Faculty of Maritime Studies in Split for a number of years. 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. Numerous adjustments of the programme to the national and international regulations have resulted in the comprehensive re-design of the study programme, with the ultimate purpose of reducing the students' and teachers' load, and creating the groundwork for harmonization with the Bologna declaration principles, current trends in the world and the latest scientific insights. 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 at the Faculty of Maritime Studies in Split are direct successors to the programmes that have been performed for over fifty 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, field of traffic technology and transport
Duration of the study programme	3 years
The minimum number of ECTS required for completion of study	180
Enrolment requirements and admission procedure	Completed 4-year high school programme

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

1. Supervise, maintain and efficiently operate the marine propulsion systems (diesel engines, steam and gas turbines, and marine steam boilers).
2. Plan and schedule operations, surveil performance, assess effectiveness, and maintain the safety of the main and auxiliary machinery.
3. Control the operation of the marine engine systems and ballast water system; detect and eliminate the causes of their malfunction.
4. Plan and organise the operation of electrical, electronic and power generating devices, and the operation of automated control and monitoring systems; detect and eliminate the causes of their malfunction.
5. Calculate the trim, stability, and hull stress.
6. Suggest the processes of safe and efficient maintenance and repair of the ship systems.
7. Plan and implement the measures of workplace safety.
8. Interpret and critically assess the elements of maritime legal regulations aimed at protection of life, sea, and marine environment.
9. Establish and maintain safety of the ship, crew and passengers, and implement life-saving, fire-fighting and other safety measures; plan and manage emergencies and situations involving damage.
10. Lead and manage the engine room crew.
11. Have knowledge of standard seamanship, organisation of work on board, ship's terminology and practice; use appropriate Maritime English in all circumstances.

The acquired theoretical knowledge and practical skills can be applied in stationary power plants.

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 (shipyards, overhaul providers, etc.).

2.4. Possibilities of continuing studies at a higher level

Every year, students holding an undergraduate degree in Marine Engineering can apply for admission into the graduate Marine Engineering study programme.

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

Holders of the four-year high-school leaving certificate can apply for the admission to the undergraduate study in Marine Engineering.

2.6. Structure, requirements and way of studying

The undergraduate study programme in Marine Engineering lasts 3 years with two semesters a year (6 semesters in total). By completing the programme students earn a total of 180 ECTS.
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.
The size of student groups during lectures, practical training, exercise and other forms of teaching has been organised in line with relevant standards and the available space and staff. As a rule, the group size in lectures does not extend over 100 students. Groups attending exercise and practical training have been structured depending on the number of students attending individual courses, but the maximum size is up to 30 students per group and, exceptionally, 36 students when only one group attends a course. Groups at computer workshops are even smaller. The size of a group attending any form of exercise allows efficiency and interactive approach to students.
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.
A student who was unable to maintain his/her student rights at another higher education institution or another constituent unit of the University of Split, may be granted permission to enrol, resume and complete the study programme under terms defined by the Regulations on studying at the Faculty of Maritime Studies in Split and the Faculty Board's decisions.

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 (name which language)

The following courses can be performed in English language:

- Marine auxiliary engines and machinery
- Marine engine systems
- Marine hydraulics and pneumatics
- Simulator and onboard practice I
- Sea and marine environment protection
- Work organisation and management on board
- Medicine for seafarers
- Autonomous ships.

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 the study programme

Final requirement for completion of the study programme	Bachelor thesis ☐ Master thesis ☐	Bachelor exam ☒ Master exam ☐
Requirements for applying for the final/diploma thesis or final/diploma/exam	Requirement for applying for Bachelor exam are passed all the exams included in the study curriculum.	
Procedure of evaluation of the final/diploma exam and evaluation and defence of the final/diploma thesis	In compliance with the Faculty Ordinance on Application for and the Course of Bachelor exam, and the Protocol of the Bachelor Exam.	

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	PFP111	Mathematics I	30		45		7
	PFS103	Technical mechanics I	30		30		7
	PFS101	Marine engineering graphics	15		30		4
	PFE223	Marine electrical engineering	45		15		5
	PFN200	Safety at sea	45		15		4
	PFP104	Maritime English I	15		30		3
	PFP147	Physical education I	0		30		1
	Total		180		195		31

LIST OF COURSES							
Year of study: 1							
Semester: 2							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFS104	Technical mechanics II	30		30		6
	PFS114	Thermodynamics and heat transfer	60		30		7
	PFS108	Strength of materials	30		15		4
	PFS117	Technology of materials	30		30		4
	PFP120	Applied computer science	15		30		4
	PFP150	Maritime English II	15		15		3
	PFP147	Physical education II	0		30		1
	Total		180		180		30

LIST OF COURSES							
Year of study: 2							
Semester: 3							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFP112	Mathematics II	30		30		5
	PFS210	Marine steam generators and heat turbines	60		15		7
	PFS211	Marine auxiliary engines and machinery	60		15		6
	PFS110	Marine engine elements	45		30		7
	PFS119	Ship structural design	30		15		5
	PFP105	Maritime English III	15		15		3
	Total		240		120		33

LIST OF COURSES							
Year of study: 2							
Semester: 4							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFS201	Marine engines	60		30		7
	PFE209	Ship power systems I	30		30		4
	PFS204	Marine engine systems	30		15		5
	PFS121	Elements of maritime transport	30		15		4
	PFP156	Maritime English IV	15		15		3
	Total		165		105		23
Elective	PFS225	Cargo handling systems	30		0		3
	PFP113	Mathematics III	30		15		4
	PFN205	Sea and marine environment protection	30		0		2
	Students select 2 elective courses.						

LIST OF COURSES							
Year of study: 3							
Semester: 5							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFE103	Automation of marine engine systems I	45		15		5
	PFE208	Ship power systems II	45		15		5
	PFS215	Maintenance management	45		15		5
	PFP129	Maritime law	30		0		3
	PFS229	Simulator and onboard practice I	0		60		3
	PFS221	Breakdown and failure detection	30		15		3
	Total		195		120		24
Elective	PFS118	Corrosion and material protection	30		0		3
		Fundamentals of maritime traffic	30		15		3
	PFP142	Medicine for seafarers	30		15		3
	PFP116	Statistics	30		15		5
	PFS401	Internship	0		150		5
	PFP106	Maritime English V	15		15		2
	Students select elective course(s) to acquire at least 60 ECTS in the 3rd study year.						

LIST OF COURSES							
Year of study: 3							
Semester: 6							
STATUS	CODE	COURSE	HOURS IN SEMESTER				ECTS
			L	S	E	F	
Compulsory	PFE108	Automation of marine engine systems II	30		15		4
	PFE224	Marine power electronics	30		15		4
	PDS223	Marine hydraulics and pneumatics	30		15		5
	PFN314	Work organization and management on board	30		15		4
	PFS233	Ship's resistance and propulsion	30		15		3
	PFS230	Simulator and onboard practice II	0		60		4
		Autonomous ships	45		0		4
	PFS400	Bachelor exam	0		10		5
	Total		195		145		33
Elective	PFS232	Technical measurements	30		15		3
	PFN304	Liquid cargo transport technology	30		15		5

	PFP164	Maritime English VI	15		15		2

3.1 Course description

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">MATHEMATICS I</td></tr>
<tr><td>Code</td><td>PFP111</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Tatjana Stanivuk, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">7</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Goran Kovačević
Marina Laušić</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="4">10</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Basic knowledge of the mathematics areas (fundamentals of algebra, mathematical analysis and corresponding mathematical methods) that are necessary for studying and student performance in other courses within the curriculum, and for the expected application in practice.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="5">None.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">1. Recognize the basic concepts of the set theory;
2. Solve tasks in the fields of real and complex numbers;
3. Define and describe the elements of the linear algebra (interpret the solutions in the system of linear equations and matrices, as well as in vector algebra and analytic geometry);
4. Examine the continuity and calculate the boundary values of functions;
5. Analyse the convergence of sequences and series;
6. Apply differential calculus in examining the properties of real functions;
7. Describe properties of real elementary functions;
8. Define a primitive function and calculate the infinite integral;
9. Interpret the methods of integration and apply the Newton - Leibniz formula to solving definite integrals;
10. Apply definite integrals when calculating the surface area.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">Lectures:
1. Introduction.
2. Overview of symbols. Sets.
3. Real and complex numbers.
4. Elements of the linear algebra. (1/2)
5. Elements of the linear algebra. (2/2)
6. Vector algebra.
7. Analytic geometry in space.
8. Elementary functions.
9. Continuity and the boundary values of functions. Infinite sequences and series of real numbers.
10. Definition and meaning of the derivation. Techniques of deriving elementary functions. Derivation of function composition.
11. Logarithmic derivative. Derivation of the implicit and parametric function. Higher-order derivations.
12. The tangent and the normal in the graph of a function. Basic theorems of the differential calculus. Application of derivations in determining function limits.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">13. Evaluation of the flow and drawing the graph of a function.
14. Definition of the infinite integral and its properties. Basic integrals. Some methods of integration.
15. Definite integrals and their properties. Application of the definite integral in calculating the area of figures in a plane.

Exercises:
1. Review of the elementary mathematics.
2. Sets.
3. Real and complex numbers.
4. Matrices and determinants.
5. Linear equation systems.
6. Vector algebra.
7. Analytic geometry of space.
8. Elementary functions. MIDTERM 1.
9. Continuity and the boundary values of functions. Infinite sequences and sets of real numbers.
10. Techniques of deriving elementary functions. Derivation of function composition.
11. Logarithmic derivative. Derivation of the parametrically or implicitly given function. Higher-order derivations.
12. The tangent and the normal in the graph of a function. Application of derivations in determining function limits.
13. Evaluation of the flow and drawing the graph of a function.
14. Definition of the infinite integral and its properties. Basic integrals. Some methods of integration.
15. Definite integrals and their properties. Application of the definite integral in calculating the area of figures in a plane. MIDTERM 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
☒ 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 (two partial exams) during the semester. In case of passing both 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 take 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>Screening student work (name the</td><td>Class attendance</td><td>1,875</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		(Other)	
	Midterm tests	5,125	Oral exam		(Other)	
	Written exam		Project		(Other)	

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

Every student has to take the written test.
The written part of the exam consists of **two midterm exams** that are held in the 8th and the 15th week of the semester. Alternatively, a student can take the **final exam** that takes place in the examination period.
A student has to achieve **at least 50% of points to pass a midterm exam**. In case a student passes both midterm exams, he/she does not have to take the final exam. If a student has passed just one midterm exam, he/she will take the final exam covering only the area that he/she failed to pass. **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**.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Attendance + Active participation	80	10
Midterm I	50	45
Midterm II	50	45

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)

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
Merlin e-learning platform; https://moodle.srce.hr/2021-2022/ MareMathics; https://maremathics.pfst.hr/	-	YES
Tomašević, M.: *Skupovi, brojevi funkcije*, Faculty of Maritime Studies in Split, 2001.	20	YES
Tomašević, M.: *Diferencijalni račun*, Faculty of Maritime Studies in Split, 2001.	20	YES

	Tomašević, M.: *Matrični i vektorski račun*, Faculty of Maritime Studies in Split, 1998.	20	YES
	Demidovič, B. P.: *Zadaci i riješeni primjeri iz matematičke analize za tehnički fakultete*, Zagreb, 1995.	15	YES
Optional literature (at the time of submission of study programme proposal)	1. Pavković, B.; Dakić, B.: *Polinomi*, Školska knjiga, Zagreb, 1988. 2. Apsen, B.: *Riješeni zadaci više matematike 1*, Tehnička knjiga, Zagreb, 1989. 3. Ušćumlić, M.; Miličić, P.: *Zbirka zadataka iz više matematike*, Naučna knjiga, Beograd, 1989. 4. Group of authors: *Mathematics – Part II*, University of Rijeka – Faculty of Maritime Studies, 1993.		
Quality assurance methods that ensure the acquisition of exit competences	Student survey carried out by the University of Split, List of student attendance, Teaching process monitoring by the Faculty, teacher's self-evaluation, Analysis of the examination passing rate (Quality Management System in compliance with ISO 9001), external evaluation of the student assessment process.		
Other (as the proposer wishes to add)			

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="6">TECHNICAL MECHANICS I</th></tr>
<tr><td>Code</td><td>PFS103</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Tina Perić, PhD, Assoc. Prof.</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>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="5">-</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with basic principles and methods in mechanics and their application in studying the effects of forces and their influence on body motion and states. Developing straightforward and logical way of thinking while analysing and solving practical engineering tasks in the area of statics and kinematics of marine engineering elements and constructions.</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. Describe basic terminology, principles and methods related to the mechanics of solid bodies and the importance of their application in maritime technologies.
2. Define the fundamentals of statics of solid bodies (areal and special systems of forces and moments, correspondence and breakup, balance, girders, friction, centre of gravity).
3. Solve and analyse the specimens of post and lattice girders under various types of load.
4. Define and understand the fundamentals of kinematic features of linear and askew motion (position, speed and acceleration) of a body in various coordinate systems.
5. Solve and analyse the examples of kinematic translation, rotation, areal and complex body motion.
6. Develop prerequisites for understanding and acquiring knowledge in other areas.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction. Tasks, elements and basic principles of mechanics. Solid body statics. Essential terminology and tasks.
2. Third Newton axiom. Axioms of statics. Relations and their reactions. Statics of a particle. Bracing of forces.
3. Correspondence, breakup and balance of forces. Solving the tasks of balance.
4. Body statics. Momentum. Momentum rules. Bracing forces. Reduction of forces.
5. Balance of forces. Solving the tasks of balance.
6. Friction. Friction in bearings, their boundary values and coefficient of friction. Sliding and rolling friction. Friction of the rope. Friction of rolling.
7. Girders. Post girders. Load. Reactions in supports and internal forces (transverse and longitudinal stresses, bending moments).
8. Static diagrams. Areal gantry girders.
9. Lattice girders. Method of nodes. Method of cross-section.
10. Centre of gravity. Area and static moment. Determining the centre of gravity’s position.
11. Kinematics. Kinematics of a particle. Essential kinematic values: displacement, velocity, acceleration, lunge. Linear motion. Uniform motion. Uniform variable motion. Simple harmonious motion.
12. Askew motion. Description of motion in Descartes', polar and natural coordinate systems.
13. Kinematics of solid bodies. Translation. Rotation around fixed axis.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">14. Areal motion. Complex motion. Kinematics of simple mechanisms. Correspondence of areal motions.
15. Kinematics of simple mechanisms. Piston mechanism. Gear mechanisms.

Exercises:
1. Statics of a particle. Bracing of forces. Breakup of forces.
2. Balance of forces.
3. Balance of forces.
4. Body statics. Reduction of the system of forces. Balance of the system of forces.
5. Balance of the system of forces.
6. Friction. Sliding friction. Friction in bearings.
7. Friction of the rope. Friction of rolling.
8. Girders. Post girders.
9. Post girders.
10. Lattice girders. Centre of gravity.
11. Kinematics of a particle. Linear motion.
12. Askew motion.
13. Kinematics of solid bodies. Translation. Rotation around fixed axis.
14. Areal motion.
15. Complex motion.</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:
At least 80% of class attendance in lectures and 100% in exercises. Insufficient attendance (justified absence up to 20%) may be compensated by performing independent assignments, 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 50% of class attendance cannot take the exam and have to re-register the course in the following academic year.

Students can pass the exam by taking and passing two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. If a student fails both midterm exams, he/she has to take the complete exam (written and oral).

Obligations of part-time students:
Their overall obligations 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>1.5</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></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>5.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous assessment of students</td></tr>
</table>

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	21.428
Midterm I	50	39.286
Midterm II	50	39.286

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)

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**
	Z. Kulenović: *Tehnička mehanika I*, Faculty of Maritime Studies University of Split, Split 2013.		
	Z. Kulenović: *Tehnička mehanika za pomorce*, Faculty of Maritime Studies University of Split, Split 2013.		
	Z. Kulenović: *Mehanika krutih tijela*, Odjel za studij mora i pomorstva Sveučilišta u Splitu, Split 2002.		

Optional literature (at the time of submission of study programme proposal)	1. O. Muftić: *Mehanika I*, Tehnička knjiga, Zagreb 1991. 2. S. Jecić: *Mehanika II*, Tehnička knjiga, Zagreb 1989. 3. J. Hannah: M. J. Hillier: *Applied Mechanics*, Longman, 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="6">MARINE ENGINEERING GRAPHICS</td></tr>
<tr><td>Code</td><td>PFS101</td><td colspan="2">Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Francisko Lukša, PhD, Assist. Prof.</td><td colspan="2">Credits (ECTS)</td><td colspan="4">4</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>15</td><td></td><td>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Compulsory</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">Master the principles and standards of technical sketching, drawing and creating documents. Familiarisation with technical drawing and independent creative production.</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. Understand the elements of the technical drawing and to interpret them adequately (ISO, DIN and HRN standards).
2. Familiarise with technical drawing.
3. Create a sketch, outline and technical drawing of an engineering element or system by using the calculation in orthogonal projection and its spatial visualisation as part of technical documentation (using technical accessories or AutoCAD).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">1. Introduction to technical drawing.
2. Rules, regulations and recommendations in line with ISO and DIN standards in creating technical drawing. Categorisation and types of technical drawings.
3. Standardisation. Preferred numbers. Basic series of preferred numbers. Drawing formats. Header, frame, component. Scales.
4. Types of lines and their application. Line groups. Technical writing.
5. Axonometric projection. Orthogonal projection.
6. Sketching of objects in orthogonal and axonometric projections.
7. Exceptions to the correct layout of projections.
8. Cross-section development and dimensioning. Exceptions to the cross-section rules. Hatching.
9. Dimensioning. Rules of dimensioning. Dimensioning of lengths, angles, skew edges and radius.
10. Dimensioning of curves, inclination, taper and cone. Simplified marking of welds.
11. Diagrams and symbols of electrical, pneumatic, hydraulic and heat machinery and devices.
12. Texture of technical surface – basic definitions and ways of marking, principles of symbol use.
13. Mechanical processing procedures suitable for specific roughness.
14. Tolerance of line segments. ISO – tolerance system. Fits. Fit systems. Examples of fit calculation.
15. Tolerances of free measures. Tolerances of forms and positions.</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>
</table>

<table>
<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 and 90% in exercises in order to take the exam and earn ECTS credits. Over the semester, program tasks are assigned to students. The assignments have to be completed and delivered by the beginning of the following semester at the latest. The program assignments are considered completed and delivered when they are assessed as successful, i.e. meeting the minimum criteria. It shall be considered that the students attending classes and completing assignments have fulfilled their obligations. The students who have not fulfilled the obligations cannot take the exam and 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 50% in exercises.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</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>Program task</td><td>1</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>1.875</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">The final grade comprises the class attendance, evaluation of the program assignment, results of the midterm tests or the final written test, and the result of the oral examination. All grade components have to meet the minimum criteria. The examination consists of two parts: written and oral. During the semester, students can take two midterm tests that are typically held in the 8th and the 15th week of the semester. In case a student passes both midterm exams, he/she does not have to take the final exam. If a student has passed just one midterm exam, he/she will take the final exam covering only the area that he/she failed to pass. In case of failing both midterm tests, a student has to take the complete final tests. Upon passing the written part of the exam, a student can take the oral exam.

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>Class attendance</td><td>80</td><td>28.125</td></tr>
<tr><td>Program assignment</td><td>100</td><td>25</td></tr>
<tr><td>Midterm I</td><td>50</td><td>23.438</td></tr>
<tr><td>Midterm II</td><td>50</td><td>23.438</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>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<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>

The same grading and evaluation criteria apply to both full-time and part-time students.
</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Kulenović Z.: Tehničko crtanje, University of Split, Faculty of Maritime Studies, Split 2003.</td><td></td><td></td></tr>
<tr><td>Kulenovíć Z.: Elementi brodskih strojeva i konstrukcija, Faculty of Maritime Studies – University of Split, 2012.</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">▪ Milan Opalić, Milan Kljajin, Slavko Sebastijanović: Tehničko crtanje, University of Zagreb – Faculty of Mechanical Engineering and Naval Architecture, University of Josip Juraj Strossmayer in Osijek, Faculty of Mechanical Engineering in Slavonski Brod, 2002.
▪ Tonči Piršić, Tehničko crtanje, University of Split – Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split 2009.
▪ R. Jakšić, Tehničko crtanje, University of Split – Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture , Split 1991.</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">MARINE ELECTRICAL ENGINEERING</td></tr>
<tr><td>Code</td><td>PFE223</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Igor Vujović, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</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>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">Acquire basic knowledge of direct current circuits, electrostatics, magnetism and alternating current circuits, necessary for studying and performing practical work in other courses within the curriculum. Apply the acquired knowledge and skills in handling electrical equipment and systems on board ships.</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 and use all principles of direct, electrostatic, magnetic and alternating current circuits.
2. Explore and assess the effect of electric power on maritime systems and living organisms.
3. Analyse and calculate complex electrical, electrostatic and magnetic circuits.
4. Perform planning and measurement in electric current circuits.
5. Master all essential safety measures when dealing with electric power.
6. Examine the impact of marine environment on electro-technical, structural and auxiliary materials.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction. Measurement, physical values, measurement units. International System of Units (SI). Matter structure. Ionisation. Physical properties of electro-technical materials. Categorisation of materials. Direct current. Basic principles of direct current circuits. Definition of the electric power. Effects of the electric power. Superconductivity. Physiological reactions to the electric shock. Vital elements of electric circuits. Strength and density of electric power. Electric potential. Electric voltage. Electric motor voltage. Resistance and conductivity.
2. Dependence of electric resistance on the material type and dimension. Dependence of electric resistance on temperature. Resistors: linear, non-linear, constant, changeable. Classification, design, marking. Renard series Rheostat and potentiometer. Electric circuit laws and their application: Ohm’s law. First and second Kirchhoff’s law. Operating modes of electric sources: idle motion and short circuit.
3. Serial, parallel and mixed connections of resistors and conductors. Star and delta connection of resistors. Transformation of connections into star and delta designs. Voltage and current divider. Serial and parallel supply connections. Real and ideal instruments. Enlarging the measuring field of the voltmeter and ammeter.
4. I-O procedure of measuring the resistance. Wheatstone and Thomson bridge. Ohmmeter. Compensator. Linear direct networks: components, branches, nodes and independent contours.
5. Transformation of the electric energy: energy, work, power, utility. Adjustment of a consumer to the supply. Joule's law and useful applications: heaters, bulbs, fuses and bimetal devices. Specific features of onboard lighting.</td></tr>
</table>

	Dimensioning of the conductors. Ship's cables. Measuring the work and power of the electric energy. 6. Electrostatics: Coulomb's law. Electric field, electric field flow. Gaussian law. Electric influence. Polarisation of the dielectrics. Dielectric strength. Distribution of charges in a conductor. Electric potential, potential difference. Static electricity. Atmospheric electricity. 7. Electrical capacity. Capacitors: types, parameters, marking. Capacitor sets. Multi-layer dielectric. Transitional phenomena in capacitors. Electrostatic energy. Flow of electrical current through gases and liquids. Outbreaks in gases. Electromagnetic induction: rotation stress, self-inductance and inter-inductance. 8. Electrolytes. Electrolytic dissociation. Phenomena on the tangential planes of the electrode – electrolyte. Faraday's laws of electrolysis. Polarisation voltage. Galvanostegia. Galvanoplastia. Sources of direct current. Primary chemical sources: electrode potentials, Leclanché, Weston, alkaline – MnO2, mercury oxide – zinc, silver oxide – zinc and lithium cells. Secondary sources: lead, steel, silver, gel and AGM batteries. Utility of batteries. Use and installation of batteries on board. Heat sources of the electric power. Light sources of the electric power. 9. Magnets and electromagnets. Terrestrial magnetism. Magnetic field effects. Magnetic field forces. Earth magnetic forces. Magnetic declination and inclination. Magnetic field, force, flow, flow density. Magnetic field of the straight conductor and coils. Permeability. Ohm's law of magnetic circles. 10. Law of current. Biot–Savart law. Law of the electric-magnetic induction. Motion voltage. Rotation voltage. Self-induction voltage. Inter-induction voltage. Circuit inductivity. Magnetic field forces. Foucault current. 11. Energy of the magnetic field. Types of materials according to their magnetic properties. Losses due to hysteresis and Foucault current. Alternating currents. Principle of generating alternating currents. Frequency, circular frequency. Symbols in presentation of alternating current values. 12. Impedance, reactance, admittance. Phase angle. Individual loads in the alternating current circuit. Series and parallel combinations of resistors. Resonance: serial and parallel. Power in alternating current circuits. Power factor. Compensation of power factor. 13. Surface effects. Rotary magnetic field. Three-phase systems. Star and delta connection. Principles of operation of electric devices. 14. Transformers. Distribution of electrical power onboard a vessel. Onboard sources and consumers of electric power. Earthing. 15. IMO requirements: specific features of the electric equipment used on board vessels. Requirements on used materials with regard to fire risk. Conditions where the electric equipment functions correctly with regard to the listing and pitching of the vessel. Effects of temperature on the installed electric equipment. Direction of the shafts in rotation electric devices when installing. Importance of the periodical checks on the proper operation of the connections. General requirements regarding the supply of electric energy and lighting in normal and emergency operation. **Exercises:** 1. Guidelines for working in a laboratory. Safety measures when performing exercises. Effects on electric power on human body. 2. Batteries. 3. Familiarisation with the electronic components. Soft soldering procedure. 4. Recognising various types of cables. 5. Measurement of the current and voltage by digital universal instruments. Measurement of the current and voltage by the analogue ammeter, voltmeter and universal instrument. 6. Kirchhoff's laws. 7. Wheatstone bridge. Measurement of resistance using a digital ohm-meter. 8. Simple check of proper operation of a marine cable.

<table>
<tr><td></td><td colspan="6">9. Power measurement in direct current circuits.
10. Serial, parallel and mixed connections of capacitors in direct current circuits.
11. Measurement of the alternating values using an oscilloscope.
12. Power in an alternative current circuit.
13. Half-wave and full-wave rectifying.
14. Simulation and animation of electro-technical occurrences.
15. Compensation hours for the students who have missed an exercise or who have not performed it correctly.</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:

A full-time student is required to attend 95% of lectures and laboratory exercises in order to take the exam and earn ECTS credits. Students should compensate for missed classes. Compensation hours can take place as arranged with the course teacher or during consultation hours, and have to prove this form of attendance by signature. Students can pass the exam by taking three midterm exams during the semester. Students are obliged to take all midterms. Students who have fulfilled the 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 are the same as for the full-time students (the course is in compliance with the STCW Convention). Ways of taking the exam are also the same.</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>0.375</td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>1.125</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">Grading and continuous assessment of full-time students:

The midterm tests are held after the 5th, 10th and 15th week in the semester.

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>Class attendance</td><td>95-100</td><td>25</td></tr>
<tr><td>Experimental work</td><td>100</td><td>5</td></tr>
<tr><td>Midterm tests</td><td>40</td><td>70</td></tr>
</table>
Grading:</td></tr>
</table>

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)

Assessment and grading 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)	Kuzmanić, Ivica: *Osnove elektrotehnike i elektronike s odabranim temama iz brodske elektrotehnike,* Faculty of Maritime Studies in Split, 2021.		online orders
	I. Kuzmanić, I. Vujović: *Osnove elektrotehnike – Zbirka riješenih zadataka*, Faculty of Maritime Studies in Split, 2005.	20	yes
	I. Vujović, I. Kuzmanić: *Repetitorij s uputama za laboratorijske vježbe iz Osnova elektrotehnike i Brodske elektrotehnike i elektronike*, Faculty of Maritime Studies in Split, 2008.	20	yes
	I. Kuzmanić: *Brodska elektrotehnika i elektronika*, Faculty of Maritime Studies in Split, 2006.	20	yes

Optional literature (at the time of submission of study programme proposal)	1. I. Vujović, I. Kuzmanić, Elektrotehnički materijali i tehnologije s primjenom, Sveučilište u Split, PFST, Redak, 2023 2. V. Pinter: *Osnove elektrotehnike – knjiga prva*, Tehnička knjiga, Zagreb, 3rd edition, 1980. 3. V. Pinter: *Osnove elektrotehnike – knjiga druga*, Tehnička knjiga, Zagreb, 3rd edition, 1978. 4. J. Payne, The Marine Electrical & Electronics Bible, A Practical Handbook for Cruising Sailors, Adlard Coles Nautical, 2007.
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">SAFETY AT SEA</th></tr>
<tr><td>Code</td><td>PFN200</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Srđan Vukša, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Mislav Maljković, M.Eng.</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">20%</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the international system of the safety of navigation, management procedures in fire-fighting operation and extinguishing onboard fire. Familiarisation with the safety and security procedures on board and their management.</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. Comment on the legal regulations within the international system of the safety of navigation.
2. Describe the functional and technological features as well as the application and maintenance of the fire-fighting systems on board.
3. Describe the procedures of fire-fighting management on board.
4. Plan, perform and analyse fire-fighting drills and abandoning ship exercise.
5. Explain the role, organisation and actions of the crew at the basic safety level.
6. Carry out and analyse the procedures in safety and security process 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. SOLAS (International Convention for the Safety of Life at Sea) – short description. Obligations regarding the periodic inspections and update of the valid certificates. Certificates and other documents required on board, in conformity with international conventions.
2. Obligations regarding keeping the records. The master’s duties and rights. Convention on the International Regulations for Preventing Collisions at Sea (IRPCS), a.k.a. Collision Regulations (COLREG) 1972. Thorough familiarisation of the SOLAS regulations (Chapters II, III, XI-2).
3. Fire-fighting organization on board. Layout of fire-fighting devices and escape routes. Fire-fighting plans. Maintenance of functionality of the rescue, fire-fighting and other safety systems. Organisation of fire and abandoning ship drills. Procedures necessary to be taken for protecting all persons on board in emergency. ETO’s duties in emergencies in dangerous environment and creation of plan for performing dangerous tasks.
4. Elements of fire and explosion, types and sources of ignition. Theory of burning: conditions and principles of burning. Burning material properties. Combustible materials, risk of fire and spreading of fire. Planning of events and reactions of crewmembers in fire emergency. The importance of limiting the damage and its mitigation after fire or explosion.
5. Necessity of constant vigilance. Actions to be taken on board: recognizing the alarms, duties and action defined by the procedures and drills. Abandoning ship procedure. ETO’s duties in emergencies in dangerous environment and creation of plan for performing dangerous tasks.</td></tr>
</table>

	6. Purpose, structure and functions of fire detecting systems. Methods and tools for prevention, detection and putting out fires. Fire and smoke detecting systems, automatic alarm systems. Risk of fire and its escalation. Functions and use of life-saving appliances. 7. Classification of fires and appropriate fire-fighting agents. Fire control on board. Fire risk areas. Fire prevention measures. 8. Fire-fighting equipment: devices and their distribution throughout the vessel. Demonstration of various portable extinguishers and breathing apparatus. Protective clothing and personal gear. Purpose, structure and functions of systems for detecting oxygen and other gases. Fixed fire-extinguishing installations. 9. Fire extinguishing methods: dealing with smaller fires and putting out larger fires by using water. Use of foam, powder and suitable chemical agents. Fire extinguishing procedures: underway and in port. Dangerous cargoes. Oil tankers. Principles of operation of photo-electrical systems for oil detection. 10. Fire-fighting procedures. Entering and passing through the department where high-expansion foam has been injected, with the life safety rope but without breathing apparatus. Fire-fighting using water mist or any other appropriate agent in the accommodation area or a simulated engine room affected by fire and thick smoke. 11. Use of breathing apparatus when putting out fire and performing rescue. Fire-fighting and rescue operations with the aid of breathing apparatus in confined spaces filled with smoke. Methods of controlling explosive conditions in the engine room. 12. Maintenance of life-saving equipment, fire-fighting gear, and other safety systems on board. Contributing to enhanced safety through increased awareness. 13. Recognising threats. Understanding the need to maintain safety awareness and vigilance by using adequate measures. Ship's safety and security planning. 14. Maintaining the conditions defined by the ship's safety and security plans. Detecting security risks and threats. 15. Performing regular safety and security inspections on board. Proper use of safety equipment and systems (if any, depending on the type of vessel). **Exercises:** 1. Fire-fighting organization on board. SOLAS manual for performing exercises. 2. Layout of fire-fighting devices on board. 3. Layout of escape routes. 4. Potential threats, precautions, actions to be taken on board, exercises. 5. Fire-fighting equipment. 6. Use of various portable extinguishers. 7. Extinguishing smaller fires. 8. Use of breathing apparatus. 9. Rescue operations with the aid of breathing apparatus in confined spaces filled with smoke. 10. Entering and passing through the department where high-expansion foam has been injected, with the life safety rope but without breathing apparatus. 11. Fire-fighting using water mist or any other appropriate agent in the accommodation area or a simulated engine room affected by fire and thick smoke. Putting out oil fires by using water mist facilities and nozzles, dry chemical powder and foam.

<table>
<tr><td></td><td colspan="6">12. Basic familiarization with the security levels in maritime industry.
13. Basic familiarization with the methods of security measures circumvention.
14. Defining the procedures for performing inspection, search, control and monitoring of the security actions defined by the ship's safety and security planning.
15. Familiarisation with the methods of surveying embarking, disembarking, and access to the vessel by individual persons and the objects they carry on board.</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
☒ on-board training</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. Students are required at least 95% of class attendance in lectures and 100% in exercises (auditory and practical) to become entitled to earn relevant certificates of competence. The students shall perform practical part of exercises on the training grounds while attending the course in Basic safety and first aid (Introductory supplemental program). 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 case of insufficient attendance, the students cannot take the exam and have to re-register the course in the following academic year. Written documents (excuses) can neither justify nor compensate for student's absenteeism. Students with less than 20% of absence, caused by illness or other justified reason, will be able to compensate for the missed classes during supplementary classes during or after the semester, but not later than one month after the completion of regular classes.
Obligations of part-time students:
Part-time students are required at least 50% of class attendance in lectures and 50% in exercises in order to take the exam and earn ECTS credits. As for acquiring the relevant certificates of competence, the same criteria 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>1.5</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></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></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 first 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. A student has to achieve at least 50% of points to pass a midterm exam. A student who fails to take or pass the first midterm test is allowed to take the second midterm test. If a student has passed just one midterm exam, he/she will take the final exam covering only the area that he/she failed to pass. This is possible until the end of the examination period in the current academic year. A student who has not taken/passed the midterm tests can</td></tr>
</table>

register for the exam in the examination periods. A student who has passed both midterm exams has to apply for the exam through the on-line service ("Studomat"), so that they can accept and register the final grade, or apply for a higher grade.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	7.5
Practical training	100	2.5
1st Midterm test	50	45
2nd Midterm test	50	45

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)

The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

Assessment and grading 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
D. Zec: *Sigurnost na moru*, Faculty of Maritime Studies in Rijeka, 2001.	20	
IMO: *SOLAS*, Consolidated Edition, IMO Publishing, London, United Kingdom, 2020.	1	
Pravila za statutarnu certifikaciju pomorskih brodova [*Rules for statutory certification of seagoing ships*], Dio 31 – Sigurnosna zaštita brodova [Security protection of ships], Croatian Register of Shipping.		yes

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

1. *The Naval Handbook for Ship Firefighters*, 8th Edition, The Nautical Institute, London, 2006.
2. IMO: *FSS Code, International Code for Fire Safety Systems*, 2015 Edition, IMO Publishing, 2015.
3. Mojaš, N., et.al., *Sigurnosna zaštita na brodu*, in: Naše more, 60(3-4)/2013. - Supplement, pp. 39-45.
4. IMO: *Guide to Maritime Security and the ISPS Code*, 2012 Edition, IMO Publishing, 2012.

Quality assurance methods that

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

ensure 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">MARITIME ENGLISH I</td></tr>
<tr><td>Code</td><td>PFP104</td><td>Year of study</td><td colspan="4">1</td></tr>
<tr><td>Course teacher</td><td>Tomislav Skračić, MA, senior lecturer</td><td>Credits (ECTS)</td><td colspan="4">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>15</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">Familiarisation with, and the use of, frequent language structures and technical and maritime vocabulary. Development of speaking, listening, reading, understanding, writing and cross-cultural skills with special focus on developing communication skills that marine engineers require in future professional environment.</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. Recognise, define and explain, in English: basic parts and dimensions of the vessel.
2. Recognise, define and describe the types of merchant ships (General cargo ships, Container ships).
3. Recognise, define and describe the types of merchant ships (LASH ships, Supertankers, LNG and LPG carriers, Passenger ships, Ro-Ro ships. Heavy lift ships. Tugs / Towboats).
4. Categorise the crewmembers according to their ranks (officers, petty-officers, ratings) and service (deck, catering and engine room departments), and describe basic duties and responsibilities of the deck and E/R officers.
5. Name the essential seafarer’s documents, with the focus on the Seaman's Book; identify the essential elements of the port infrastructure. In English language, interpret and provide information on the above topics, orally and in writing.</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. Basic ship terminology. Vessel's principal parts and dimensions.
3. Basic ship terminology. Principal elements of the ship's structure.
4. Types of ships: General cargo ship, Liberty class, Steamers, LASH.
5. Types of ships: Tankers. Oil tankers. Supertankers. Chemical / Product tankers. LNG and LPG carriers.
6. Types of ships: Heavy lift ships. Tugs (Towboats). Ro-Ro ships, Car carriers, Ferries. Passenger ships. Cruise ships.
7. Types of ships: Bulk carriers. Container ships. Multi-purpose vessels. Special-purpose vessels.
8. Review.
9. Manning of a vessel: Master, Deck department, Catering.
10. Manning of a vessel: Engine room department.
11. Ships' crew: duties of officers, petty officers and ratings.
12. Signing on: seafarer's essential documents – Seaman's book, Certificates of competency, Vaccination certificate, etc.
13. Basic certification. Requirements for becoming the Second Engineer / Chief Engineer on a vessel powered by 3000 kW and more.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">14. Port infrastructure terminology – port vs. harbour, quay, dock, jetty, pier, breakwater, marina, etc.
15. Review of technical vocabulary and grammar structures.

Exercises

1. Shipping – a short intro for absolute beginners.
2. Ship's terminology. The Present Simple.
3. Principal parts and dimensions. Position of ship's elements (adverbs / prepositions aft / after / fore / forward / astern etc.).
4. Making definitions. Structure of English sentence.
5. Describing a process: The Present Simple vs. Continuous.
6. Describing a process: The Past Simple vs. Continuous.
7. The Present Perfect Tense (Simple & Continuous).
8. MIDTERM test 1.
9. Expressing the future – The Future Simple Tense.
10. Expressing the future – The Present Continuous, 'Going to' Future.
11. Organisation of work on board ship.
12. Duties of officers, petty officers and ratings.
13. Seafarer's essential documents. Irregular verbs.
14. Final review.
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
☒ 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 (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, 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 50% of class attendance cannot take the exam and have to re-register the course in the following academic year.

Obligations of part-time students: Records of student attendance are kept as attending lectures and exercises is compulsory. Part-time students are required at least 50% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance (due to employment, internship, apprenticeship, illness…) may be compensated by performing additional tasks, i.e. additional individual workload.</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>Active participation in class</td><td>0.5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td colspan="2">(Other)</td></tr>
<tr><td>Midterm tests</td><td>1.375</td><td>Oral exam</td><td>(1)</td><td colspan="2">(Other)</td></tr>
<tr><td>Written exam</td><td>(1)</td><td>Project</td><td></td><td colspan="2">(Other)</td></tr>
</table>

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

Students can pass the exam by taking **two midterm exams** during the semester. In the examination period, they can re-take the midterm exam that they missed or failed. If a student has actively participated in class, he/she does not have to take the **oral exam**. Students shall take the oral exam in case of insufficient activity in class or if they do not agree with the final grade the teacher has suggested and would like to achieve a higher grade. The final grade comprises the class attendance, results of the midterm tests or the final exam, and the activity in class.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Midterm I	50	37.5
Midterm II	50	31.25
Attendance + Active participation	80	31.25

Final assessment

Assessment tools – final exam	Performance (min. %)	Participation in the final grade (%)
Written exam	50	50
Oral exam	50	30-50
Previous activities	80	0-20

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)

The same assessment and grading criteria apply to full-time, part-time and incoming Erasmus+ students.

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

Title	Number of copies in the library	Availability via other media
Spinčić, A., *An English Textbook For Marine Engineers I.*, 3rd amended edition, Faculty of Maritime Studies in Rijeka, 2008.	20	yes
Skračić, T.: PowerPoint presentations available at Merlin e-learning platform.	-	yes
Luzer, J., Spinčić, A., *Gramatička vježbenica engleskog jezika za pomorce*, Faculty of Maritime Studies, 3rd edition, Rijeka 2003.	5	yes

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

1. Spinčić, A., Luzer, J. *Engleski u brodostrojarskim komunikacijama – English in marine engineering communications*, 3rd amended ed., Adamič, Rijeka 2007.
2. Plančić, B., Skračić, T.: *Englesko-hrvatski pomorski rječnik / English-Croatian Maritime Dictionary*, Faculty of Maritime Studies in Split, 2017
3. Kluijven, P. C. van, *The International Maritime Language*, Programme, Alk & Heinen Publishers, Alkmaar, 2003, The Netherlands.

	4. Selected articles and reading from magazines, manuals, and other material containing instructions on using, maintaining and servicing marine engines.
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">PHYSICAL EDUCATION I</td></tr>
<tr><td>Code</td><td>PFP147A</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Mislav Lozovina, PhD, associate professor</td><td>Credits (ECTS)</td><td colspan="5">1</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Marin Barišić</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></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="5"></td></tr>
<tr><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Training students to perform self-exercise at work or adequate training ground onboard the vessel where he/she lives and works. Enabling students to select the type and load of exercise, especially for the muscle clusters that are at risk in the workplace. Training students to apply the procedures and techniques of abandoning a sinking vessel, getting out of water, opening the life raft, boarding the raft or boat, turning the life raft upright, jumping into water and swimming using a life jacket, jumping into water and swimming using isothermal suit, diving, survival in water.</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. Acquire general and specific motoric abilities, skills, knowledge and habits.
2. Maintain and improve motoric abilities as a health prerequisite for a seafarer on board.
3. Adjust the exercises and techniques to one's own abilities.
4. Apply the acquired knowledge, skills and motoric habits to self-exercise at work.
5. Demonstrate and apply the acquired knowledge and techniques of getting out of water, opening the life raft, boarding the raft or boat, turning the life raft upright, jumping into water and swimming using a life jacket, jumping into water and swimming using isothermal suit, diving, survival in water.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">This course is performed on various premises: in a gym, at a pool, and at sea. The weather conditions affect the amount of rowing hours. The harmonisation of the faculty timetable and the pool timetable affects the amount of swimming hours. Fair weather allows increased activities at sea. Physical exercises in the gym are focused on maintaining the good health and fitness of students and seafarers.

1. Code of conduct at the pool. Jumping into water, getting out of water, swimming test. Rescuing and retrieving a person from the water in case of likely drowning, and rendering first aid. Swimming and rescuing a drowning person. Diving under an imaginary oil spill. Putting the isothermal suit on. Getting out of water, opening the life raft, boarding the raft or boat, turning the life raft upright, jumping into water and swimming using a life jacket, jumping into water and swimming using isothermal suit, diving, survival in water.
2. Rowing in cutters – elementary technique (rowing activities depend on the available material and technical resources).
3. Fundamentals of kinesiological transformation – the gym allows training activities that allow students and seafarers to carry out exercises and psycho-physical shape that is sufficient for proper performance of their jobs and professional tasks.

A note on ROWING:

Cutters and/or boats are used for rowing activities. Classes are held on Saturdays and Sundays so that the part-time students can meet this requirement. Classes can</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">be also attended by full-time students. Part-time students may opt for a seminar paper instead.</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
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:
Records of student attendance are kept as attending exercises is compulsory. At least 80% of attendance is required. In case of insufficient attendance, students cannot take the exam and 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. Part-time students may opt for a seminar paper.</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>0,25</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are no grades in this course. Students obtain ECTS credits by meeting attendance requirements.

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>Class attendance</td><td>80</td><td>100</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Required literature (available in the library and via other media)</td><td colspan="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td></td><td colspan="4">Lozovina V.: Sportovi na vodi, University textbook, Split 2001.</td><td>25</td><td>yes</td></tr>
<tr><td></td><td colspan="4">Zec, D.: Sigurnost na moru, Faculty of Maritime Studies in Rijeka, 2001.</td><td>5</td><td>-</td></tr>
<tr><td></td><td colspan="4">Lozovina V., Lozovina M. (2012): Theory and mathematical modulation of sports training, Paradigm of Methodological Theory and Mathematical Modulation of Sports Training, LAP LAMBERT Academic Publishing, Saarbrücken, Germany, ISBN: 978-3-659-24998-3.</td><td></td><td></td></tr>
<tr><td></td><td colspan="4">Bompa, T., Buzzichelli, C. (2015): Periodization training for sports, Human Kinetics Publishers,</td><td></td><td></td></tr>
</table>

	Champaign, United States, ISBN10: 1450469434, ISBN13: 9781450469432.		
Optional literature (at the time of submission of study 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">TECHNICAL MECHANICS II</td></tr>
<tr><td>Code</td><td>PFS104</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">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>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="5">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with basic principles of dynamics and their application in studying the effects of forces and their influence on body motion. Developing straightforward and logical way of thinking while analysing and solving practical engineering tasks in the area of dynamics of marine engineering elements and constructions. Understand the basics of fluid statics. Acquire the fundamentals of fluid statics and fluid dynamics to be able to solve the fluid flow tasks that are inevitable in marine engineering practice.</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 and understand the fundamentals of body motion dynamics within various coordinate systems.
2. Explain the notion of work, power, mechanical energy, impulse, quantity of motion, momentum of motion quantity and mass geometry.
3. Solve and analyse simple examples of the translation dynamics, rotation and areal body motion.
4. Distinguish physical properties of liquids and basic values in fluid mechanics.
5. Calculate the force of fluid exerted on the flat surface and force components on the curved surface in still liquid.
6. Understand the effect of buoyancy and calculate the buoyancy and stability of the floating body.
7. Apply the Bernoulli equation in solving practical examples of liquid flow and leak in simple hydrodynamic devices.
8. Formulate and calculate energy loss in laminar and turbulent flow of the liquid through pipelines and changed cross-sections of the pipelines.
9. Create prerequisites for understanding and acquiring new knowledge in other courses within the curriculum.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Dynamics. 1st and 2nd Newton’s axiom. Notions of force and mass. Dynamics of a particle in rectangular, cylindrical and natural coordinates. Equations of motion. D’Alembert's principle. Work and power. Kinetic and potential energy.
2. Impulse and motion quantity. Momentum of motion quantity.
3. Dynamics of the solid body. Geometry of the mass. Translation.
4. Solid body rotation around fixed axis. Dynamic reactions in the journals.
5. Areal motion of the body.
6. Hydromechanics. Introduction. Basic notions, pressure, density, stress, viscosity of fluids. Statics of liquids. Change of pressure in liquids.
7. Hydrostatics. Pressure force of a liquid on the flat and curved surfaces. Calculation of the wall thickness of the pipeline under pressure.
8. Hydrostatic buoyancy. Archimedes' principle. Stability of emerged body and vessels.
9. Kinematics of the liquid. Flow types. Equation of continuity. Flow of liquids through pipelines. Venturi tube.</td></tr>
</table>

	10. Dynamics of the liquid. Bernoulli's equation for ideal and real liquids. Measurement of the flow by means of the Venturi tube. 11. Leaking of the liquid through small and large openings. 12. Principle of impulse. Equation of impulse. Laws of similarity. Geometrical, kinematic and dynamic similarity. Reynold's and Froude's number. 13. Real liquid flow. Determining friction loss in laminar and turbulent flows. 14. Resistance during the flow of liquids. Calculation of total losses while a liquid is passing through the pipeline. 15. Circulation. Friction resistance, shape resistance and overall resistance while a body is passing through a fluid. Cavitation. Causes of cavitation. Cavitation number. Cavitation erosion. Types of cavitation during the flow of fluid or the motion of a body through a fluid. **Exercises:** 1. Application of the equations of motion and D'Alembert's principle in forced motion of a material particle. Examples of calculating work, power, kinetic and potential energy of a particle. 2. Examples of applying the force impulse, law of motion quantity and momentum of motion quantity. 3. Determining the moment of inertia in simple homogeneous bodies and for parallel axes. Using body motion equations for solving the problems in rotation motion of bodies. 4. Calculation of dynamic reactions in the journals, kinetic energy and kinetic momentum in a rotating body. 5. Solving problems in the areal motion of a body by using body motion equations. Calculation of the kinetic energy and momentum. 6. Basic measures in hydromechanics. Viscosity units. Pressure gauging and viscosity calculation. 7. Pressure force of a liquid on the horizontal and askew surface. Acting of the pressure force of a liquid on the flat and curved surfaces. Calculation of the wall thickness of the pipe. 8. Calculation of buoyancy of the emerged and floating bodies. Determining the stability of the vessels. 9. Application of the equation of continuity. Determining the rate and flow of liquids through pipelines. 10. Venturi tube. 11. Examples of using Bernoulli's equation in the flow of ideal fluids. 12. Examples of leaking of the liquid through small and large openings. 13. Application of the equation of impulse when determining the force of the jet impact on the fixed and moving plates and blades. 14. Determining the friction loss for various types of streaming and tube roughness. Determining the friction loss and local resistance during the fluid's flow. 15. Examples of calculating the characteristic values (rate, pressure, flow, losses) of a simple pipeline system.
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	**Obligations of full-time students:** Records of student attendance are kept as attending lectures and exercises is compulsory. Students have to attend at least 95% of lectures and 100% exercises to take the exam. Justified absence up to 20% may be compensated through tutorials or seminar paper, i.e. individual workload. Students with poor attendance cannot take the exam have to re-register the course in the following academic year.

<table>
<tr><td></td><td>Students can pass the exam by taking two midterm exams during the semester. Students who have missed or failed the midterm exams shall take the complete written exam. The student who has passed 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 exam again 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.</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></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>4.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></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:

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 7th week, while the second midterm test comprises Lectures 7-14 and is held in the 15th week of the semester. Sample tests 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 1st midterm test in the 15th week of the semester, while the 2nd midterm test can be re-taken during the examination period. The midterm tests can be re-taken by students who achieve less than 50% in both tests. The final grade comprises the class attendance and results of the midterm tests. 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.

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</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>

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">The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Z. Kulenović, Tehnička mehanika za pomorce (Technical mechanics for seafarers), University of Split – Faculty of Maritime Studies, Split, 2013.</td><td></td><td>yes</td></tr>
<tr><td>Jecić, S.: Mehanika II, Tehnička knjiga, Zagreb 1989.</td><td>1</td><td>yes</td></tr>
<tr><td>Pečornik, M., Tehnička mehanika fluida, Školska knjiga, Zagreb, 1989.</td><td>1</td><td>yes</td></tr>
<tr><td>Matković, M., Bukša, A., Zbirka zadataka iz hidromehanike, Pomorski fakultet, Rijeka, 1989.</td><td>1</td><td>yes</td></tr>
<tr><td>Lectures and exercise at Merlin e-learning platform.</td><td></td><td>online</td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. A. Pytel, J. Kiusalaas, Engineering Mechanics-Dynamics, 4th edition, Cengage Learning, 2017.
2. K. Subramanya, 1000 Solved Problems in Fluid Mechanics (Includes Hydraulic Machines), Tata McGraw-Hill, 2005.</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">THERMODYNAMICS AND HEAT TRANSFER</th></tr>
<tr><td>Code</td><td>PFS114</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">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>60</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="5">/</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Distinguishing the properties of ideal and real gases (vapours) and admixtures in the thermodynamic analysis of the processes and cycles of converting heat energy into useful work and vice versa. Decomposition of a cycle into processes. Assessment of the conversion cycle (efficiency). Analysis of humid air properties and related processes. Calculation of losses during conversion of energies or heat exchange. Analysis of heat transfer means.</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 processes and cycles (ideal and real) involving ideal and real gases (vapours) and mixtures of ideal gases and vapours.
2. Calculate the conversion and rate of conversion (efficiency) of heat into useful work on the basis of the First and Second principles of thermodynamics.
3. Calculate the maximum available work and available technical work (exergy).
4. Analyse and solve the processes involving humid air.
5. Analyse and calculate the lower and upper heat value of (fossil) fuel and the combustion products according to their composition.
6. Calculate the amount of heat exchanged and the capacity of heat exchangers.
7. Independently assess and take measures aimed at increased energy efficiency.</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. Basic thermodynamic values. Conservation of mass and energy.
2. Ideal gas and specific heat capacity. Equations of state. Mixing gases and vapours.
3. Main principles of thermodynamics. Internal energy, enthalpy, entropy and heat.
4. Reversible and irreversible processes. Circuit processes and thermodynamic relationships.
5. Entropy and irreversibility. Characteristic irreversible processes.
6. Circular processes of heat engines. Efficiency levels.
7. Open systems with ideal gas.
8. Operative ability of the thermodynamic system (maximum work, exergy).
9. Steam and steam processes.
10. Steam processes, cooling processes – surplus of heat.
11. Humid air and processes involving humid air.
12. Fundamentals of combustion process.
13. Flow of gases and liquids.
14. Heat transfer: conducting, convection. Heat transfer coefficient.
15. Heat transfer: radiation.</td></tr>
</table>

<table>
<tr><td>Format of instruction</td><td colspan="6">☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="6">☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="12">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. Over the semester, individual home tasks are assigned to students. The correctly performed assignments have to be completed and delivered as proof of active participation in class. The home assignments are considered completed and delivered when they are assessed as successful, i.e. meeting the minimum criteria. The students attending classes and completing their assignments shall be deemed to have fulfilled obligations. The students who have not fulfilled the obligations cannot take the exam and 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 50% in exercises. Other requirements 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>2.25</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>4.5</td><td>Oral exam</td><td>0.25</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="12">The final grade comprises the class attendance, evaluation of the individual home assignments, results of the midterm tests or the final exam. All grade components have to meet the minimum criteria. The examination consists of two parts: written and oral. During the semester, students are continuously assessed through three midterm tests that are held in the 3rd, 11th 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 passed just one midterm test, he/she will take the final exam covering only the area that he/she failed to pass. If a student has missed or failed two or three midterm tests, he/she has to take the complete final exam. A student passes the exam after meeting the minimum criteria, as defined by the course teacher, on midterm tests or the 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>32.142</td></tr>
<tr><td>Assignments / seminar paper</td><td>100</td><td>3.572</td></tr>
<tr><td>Midterm test 1</td><td>50</td><td>21.428</td></tr>
<tr><td>Midterm test 2</td><td>50</td><td>21.428</td></tr>
<tr><td>Midterm test 3</td><td>50</td><td>21.428</td></tr>
</table>
Grading:</td></tr>
</table>

<table>
<tr><td></td><td>
<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>

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>Fabris, O.: Osnove inženjerske termodinamike, Faculty of Maritime Studies in Dubrovnik, 1994.</td><td></td><td></td></tr>
<tr><td>Ivan Pivac, Ivan Tolj, Sandro Nižetić: Zbirka zadataka iz termodinamike i termotehnike, University of Split – Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2024. (Print: Redak d.o.o.)</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. Bošnjaković, F.: Nauka o toplini I dio; Tehnička knjiga, Zagreb, 1976.
2. Bošnjaković, F.: Nauka o toplini II dio; Tehnička knjiga, Zagreb, 1976.</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">STRENGTH OF MATERIALS</td></tr>
<tr><td>Code</td><td>PFS108</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Francisko Lukša, 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>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">Teaching students to observe, in an adequate and critical way, the elements of engineering constructions in marine engineering, shipbuilding and maritime trade. Making conclusions on interdependence of their loads, shapes, dimensions, deformations, strains, stresses, strength, rigidity and stability. This basic knowledge is essential for understanding and performing other tasks in marine engineering practice.</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 basic terminology in the mechanics of deformable bodies, types of load, stress and strain of construction elements.
2. Explain mutual interdependence between stress and deformation, nominal and allowed stress, stress concentration, as well as heat and initial stress.
3. Describe stress states (uniaxial, biaxial, triaxial) and explain main stresses.
4. Define the requirements of strength, rigidity and stability of construction elements.
5. Determine geometrical characteristics of flat cross-sections.
6. Analyse and calculate stresses and strains under basic types of load (tensile, compressive, axial, torsion, shear, bending).
7. Understand the ways of solving non-defined static problems.
8. Explain the theory of strength. Determine equivalent stresses under complex forms of load.
9. Apply the acquired knowledge in solving concrete tasks within marine engineering practice and make necessary conclusions.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:

1. Introduction. Types of load. Stress. Stress tensor.
2. Deformation. Tensor of deformation. Interdependence of stress and deformation. Hooke's law. Nominal and allowed stress. Coefficient of safety.
3. Axial loads. Analysis of stresses and deformations. Calculation of axially loaded bars.
4. Non-defined static cases of axial load. Initial and heat loads. Saint-Venant's principle. Concentration of stress and its effects.
5. States of stress. Uniaxial and biaxial states of stress. Mohr's circle of stresses.
6. Thin-walled pressure vessels. Shear. Analysis of stresses and deformations. Calculation of shear in construction elements.
7. Geometrical characteristics of flat cross-sections. Static moments of the surface. Inertia moments of the surface. Resistance moments of the surface.
8. Torsion. Stresses and deformations of round cross-section rods. Dimensioning of the torsion loaded rods.
9. Non-defined static cases of torsion. Bending. Pure bending. Stresses and deformations of a rod.
10. Bending by forces. Analysis of stresses of a rod. Calculation of strength.
11. Limit of elasticity. Non-defined static cases of bending.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">12. Askew bending. Deflection. Deflection within the area of elasticity.
13. Deflection within the area of plasticity. Calculation of deflection in bars.
14. Complex load. Theories of strength. Axial load and bending of bars.
15. Bending and torsion of round cross-section rods.

Exercises:

1. Types of load. Stress.
2. Deformation. Interdependence of stress and deformation. Nominal and allowed stress. Coefficient of safety.
3. Axial loads. Analysis of stresses and deformations. Calculation of axially loaded bars.
4. Non-defined static cases of axial load. Initial and heat loads. Concentration of stress.
5. States of stress. Thin-walled pressure vessels.
6. Shear. Analysis of stresses and deformations. Calculation of shear in construction elements.
7. Geometrical characteristics of flat cross-sections.
8. Torsion. Stresses and deformations of round cross-section rods. Dimensioning of the torsion loaded rods.
9. Non-defined static cases of torsion. Bending. Pure bending. Stresses and deformations of a rod.
10. Bending by forces. Analysis of stresses of a rod. Calculation of strength.
11. Limit of elasticity.
12. Non-defined static cases of bending. Askew bending.
13. Deflection. Calculation of deflection in bars.
14. Complex load. Axial load and bending of bars.
15. Bending and torsion of round cross-section rods.</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:

At least 80% of class attendance in lectures and 100% in exercises. Insufficient attendance (justified 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 50% of class attendance cannot take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. If a student fails both midterm exams, he/she has to take the complete exam (written and oral).

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students.</td></tr>
<tr><td rowspan="4">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>1.125</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>
</table>

<table>
<tr><td>equal to the ECTS value of the course)</td><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous assessment of students
<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>
<tr><td>Midterm I</td><td>50</td><td>35.937</td></tr>
<tr><td>Midterm II</td><td>50</td><td>35.937</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>
<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>Z. Kulenović: Čvrstoća materijala, Faculty of Maritime Studies – University of Split, 2010.</td><td>40</td><td></td></tr>
<tr><td>Z. Kulenović: Nauka o čvrstoći, Faculty of Maritime Studies – University of Split, 2003.</td><td></td><td>yes</td></tr>
<tr><td>Z. Kulenović: Čvrstoća elemenata pomorskih konstrukcija, Riješeni zadaci, Faculty of Maritime Studies – University of Split, Split 2001.</td><td>5</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 colspan="6">1. Alfirević: Nauka o čvrstoći I, Tehnička knjiga, Zagreb 1995.
2. Z. Kulenović: Ravni nosač, Proračun, Odjel za studij mora i pomorstva – University of Split, 2002.</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><th colspan="2">NAME OF THE COURSE</th><th colspan="6">TECHNOLOGY OF MATERIALS</th></tr>
<tr><td>Code</td><td>PFS117</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Liane Roldo, PhD, full 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>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="5">/</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with the fundamentals of material technologies, including welding, casting and scraping, and with the application of materials.</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. Distinguish the material properties.
2. Perform the independent testing of material properties and interpret them.
3. Distinguish procedures and establish parameters of welding with regard to the welded materials.
4. Select adequate heat processing of the material with regard to the requirements the specimen is expected to meet.
5. Identify the causes of corrosion and adequately protect the material against corrosive effects.
6. Distinguish the basics of casting technology.
7. Familiarise with scraping procedures.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction to the technology of materials. Categorisation of materials: structure, allotropic modification, cooling curves.
2. Alloy diagram. Iron: meta-stable alloy diagrams of Fe-Fe3C and microstructure.
3. Material properties: physical, chemical and mechanical properties. Focus on mechanical properties (strength, elasticity, dynamic endurance testing, hardness and toughness).
4. Production processes: casting – designing moulds and cores. Errors in castings.
5. Production processes: processing by deformation, forging and scraping (turning, milling, planing, drilling, grinding). Tools.
6. Production processes: welding, built-up welding, soldering, metallisation (REL, MIG (Metal Inert Gas), MAG (Metal Active Gas), TIG (Tungsten Inert Gas), EPP, EPT, EO, GMAW (Gas Metal Arc Welding), ERW (Electric resistance welding), laser welding, FSW (Friction Stir Welding).
7. Production processes: heat cutting techniques (gas, plasma, arcair, oxyarc).
8. MID-TERM 1.
9. Heat processing: annealing, upgrading, normalization, calcination.
10. Thermo-chemical processing: cementation, nitriding, carbonitriding, boriding.
11. Production and categorisation of steel alloys, their properties and applications (welding steels, tool steels).
12. Ferrous and non-ferrous metals: production, properties and application.
13. Sintered materials, bearing alloys, polymers, ceramics, composite materials.
14. Non-destructive testing: penetrants, magnetic testing, ultrasound imaging, X-rays, RTG, isotopes.
15. MID-TERM 2.
Exercises:</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">1. Metallography.
2. Heat processing: annealing of low-carbon, medium-carbon and high-carbon steels. Hardness testing in 3 annealed steels and comparison of the results.
3. Heat processing: normalization of low-carbon, medium-carbon and high-carbon steels. Hardness testing in 3 annealed steels and comparison of the results.
4. Heat processing: calcination of low-carbon, medium-carbon and high-carbon steels. Hardness testing in 3 annealed steels and comparison of the results.
5. Heat processing: upgrading the 3 annealed steels (number 4), hardness testing in 3 annealed steels and comparison of the results.
6. Surface processing: cementation of low-carbon steels, hardness testing and comparison of the results.
7. Testing of hardness. Calculation of the steel strength based on the measured hardness.
8. Normalization of the welding processes.
9. Turning.
10. Milling.
11. Planing, drilling.
12. REL, MIG/MAG welding.
13. Hot Wire Tig (TIG) welding, GMAW, ERW welding.
14. Heat and plasma cutting, arcair, oxyarc.
15. Testing by using penetrating liquids. Magnetic testing, ultrasound testing.</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">Attendance in lectures (80% for full-time students, 50% for part-time students), exercises (100%) and field work (100%). In case of insufficient attendance, students cannot take the midterm or the final exam and have to re-register the course in the following academic year.

Obligations of full-time students:
Over the semester, students can pass the exam by taking two midterm tests covering the respective course contents (lectures and exercises). Students have to achieve at least 50% on each midterm test. Students are obliged to take both midterms. Students shall take the final written exam in the examination period in case they miss or fail the midterm tests.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students.</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>(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></td><td colspan="5"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">Continuous assessment of students:

This includes the attendance in lectures (80% for full-time students, 50% for part-time students), exercises (100%) and field work (100%).</td></tr>
</table>

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Midterm I	50	40
Midterm II	50	40
Seminar paper	100	20

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 to attend at least 50% of lectures, 100% of exercises and 100% of field work. 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)	I. Duplančić, N. Krnić. *Materijali 3*, zavod za strojarsku tehnologiju. University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2009.		
	I. Gabrić, S. Šitić. *Materijali I*. University of Split, Sveučilišni Odjel za Stručne Studije, Split, 2012.		
	I. Gabrić, S. Šitić. *Materijali II*. University of Split, Sveučilišni Odjel za Stručne Studije, Split, 2015.		
	W. D. Callister, Jr., D. G. Rethwisch. *Materials Science and Engineering An Introduction*, John Wiley & Sons, Inc., 2018.		
	M. P. Groover. *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems*, John Wiley & Sons, Inc., 2019.		
Optional literature (at the time of submission of study programme proposal)	▪ James F. Shackelford. *Introduction to Materials Science for Engineers*. 2015. ▪ D. J. Eyres, G. J. Bruce. *Ship Construction*. Elsevier Ltd, 2012. ▪ R. Timings. *Fabrication and Welding Engineering*. Elsevier Ltd, 2008. ▪ N.R. Mandal. *Ship Construction and Welding*, vol. 2. Springer Series on Naval Architecture, Marine Engineering, Shipbuilding and Shipping, 2017. ▪ *Ship Design and Construction*, vols. 1 and 2. T. Lamb. ed. The Society of Naval Architects and Marine Engineers, 2003. ▪ A. Šestan: *Tehnologija materijala i obrade*, Faculty of Maritime Studies in Rijeka, 1997.		
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="6">APPLIED COMPUTER SCIENCE</td></tr>
<tr><td>Code</td><td>PFP120</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Jelena Čulić Gambiroža, PhD</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Joško Botić</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>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 structure and the operation principles of computers and acquiring knowledge from the areas of program support and basic programming, which are necessary for understanding program packages needed in performing maritime processes.
Acquiring knowledge and skills for text editing, spreadsheet design and making presentations.
Training students to solve problems and manage data on board ship and in maritime industry by using computer technology.</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. Accurately calculate a complex mathematical expression by using a calculator.
2. Install and adjust the operating system, connect the computer to the network, select and install applications.
3. Create a document by using a word processor of MS Word type.
4. Perform a technical calculation by applying a table / spreadsheet calculator of MS Excel type.
5. Develop an algorithm, display in the structogram, and design a program in MS Excel by using VBA according to the needs, explore the program and verify (evaluate) the validity of its results.
6. Make a presentation in MS PowerPoint.</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. Mathematical-logic computer fundamentals.
3. Processor and computer memories.
4. Hard memory. Input-output units.
5. Computer networks. Internet / intranet / extranet and LAN.
6. Program support. Operation systems (OS).
7. General categories of OS.
8. Auxiliary programs. Application program support.
9. Dana types. Arithmetic, logic and relation operators in program packages.
10. Basic commands for data input/output, declaration of variables and constants, attributing values to the variables.
11. Program flow control – basic selections.
12. Program flow control (for, while and do… while loop).
13. Import and export of data from / into a file.
14. Computer safety: viruses, anti-virus programs, firewall, antimalware. Identifying the symptoms of an affected computer. Web services of the type: virustotal.com.

Exercises:</td></tr>
</table>

	1. Personal computer (PC): demonstrate the procedure of an OS installation (current version of Windows); explain the difference between 32-bit and 64-bit OS; adjusting the system and communication commands during installation; data storage in folders; management of folder systems and individual files; back-up copies. Data storage systems. Retrieving lost data. 2. Commercial computer tools for office work (e.g. MS Office), with an emphasis on the applications within Visio package. Free tools for office work. 3. Computer tools for word processing, e.g. MS Word. Writing and editing of text, paragraphs, chapters, headers and footers. Adjusting the pre-defined chapter formats. Tables and their formatting. Insertion of images into text and their formatting. Insertion of text into an image. 4. MS Word: grammar and spelling check of the text. Creating and editing mathematical expressions (formulae). Numeric indication of paragraphs, figures, tables, formulae. Referencing to automatically updated numeric notations in the text. Automatic creation of the table of contents and list of references. Storage formats: docx, doc, pdf, txt. File printing and e-mailing. 5. Table calculator (MS Excel). Opening, editing and saving books. Managing books and spreadsheets. Addressing cells. Text editing in spreadsheets. Defining custom equations in formula lines. 6. Table calculator (MS Excel). Use of installed mathematics and statistics commands, such as the determinant calculation functions, inverse matrices and matrix multiplication. 7. MS Excel: data sorting. Automatic filters and their advanced application. Application of logical variables in mathematical expressions. Retrieving data from text or csv file. Graphical display of data. Shapes and diagrams. Editing diagrams. 8. Using program packages MS Word and Excel. 9. MS Excel – advanced use: Visual Basic for Applications (VBA). Sub-programs of Function and Sub type. Data transfer from Excel to VBA and vice-versa, by using named variables and fields. Fundamentals of VBA programming: If-Then-Else, For-Next, Repeat-Until, While-Do structures. 10. Display of the program flow with the aid of a structogram. Creating simple programs in MS Excel (using VBA): solving quadratic and cubic equations; system of linear equations 3 x 3; generating a system of linear equations n x n in random numbers, solving them and checking the result accuracy.
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☒ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	**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 100% in exercises in order to take the exam and earn ECTS credits. The students who have not fulfilled the obligations cannot take the exam and have to re-register the course in the following academic year. **Obligations of part-time students:** In order to meet the requirements and take the exam, students are required at least 50% of class attendance in lectures and 100% in exercises.

<table>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</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">
During the semester, students can take three midterm tests. The first two involve laboratory exercises with the purpose of checking the student competence in MS Word and MS Excel, and writing simple programs.
1st midterm test – performance in MS Word and MS Excel,
2nd midterm test – fundamentals of programming, using MS Excel VBA,
3rd midterm test – theoretical part.
The midterm test assessing the theoretical knowledge is held in written form and is passed if a student provides at least 50% correct and explained answers. A student who passes all midterm tests does not have to take the final written and oral examination. A student not passing all the midterms can apply for the final exam and get the remaining competences evaluated as part of the final exam. This partial examination consists of the theoretical part (in written and/or oral form) and the practical part. A student is allowed to take this partial examination only if he/she has achieved the satisfactory quota of the previous obligations, i.e. class attendance, laboratory exercises, passed midterm(s).
Students who have completed all obligations but have missed or failed the midterms held during the semester, are required to apply for the complete exam that is held in each examination period.
The final examination is held during the examination period after registering through the on-line service (“Studomat”). The examination consists of the theoretical part (in written and/or oral form) and the practical part. The practical part of the examination is a written test involving the creation of algorithms by using the commands of the C programming language. Prior to taking the theoretical test, it is necessary to solve at least 50% of the tasks in the practical part of the exam.
Upon passing all theoretical and practical midterm tests, or before applying for the final examination, students have to register through the on-line service (“Studomat”) to obtain the grades. The final grade is determined on the basis of their overall achievement.
The same grading criteria apply for the continuous assessment of student achievements and for the final examination.

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>Class attendance</td><td>80-100</td><td>31.25</td></tr>
<tr><td>1st Midterm test</td><td>50-100</td><td>22.92</td></tr>
<tr><td>2nd Midterm test</td><td>50-100</td><td>22.92</td></tr>
<tr><td>3rd Midterm test</td><td>50-100</td><td>22.92</td></tr>
</table>
Grading:
</td></tr>
</table>

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)

Assessment and grading of part-time students:
Part-time students are required to achieve at least 50% of class attendance to be entitled to take the exam. 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)	A. Munitić, P. Ristov, A. Gudelj Bolanča, M. Nadrljanski: *Primjena elektroničkih računala*, Faculty of Maritime Studies in Split, 2008.	15	
	R. Vujin: *Zbirka zadataka iz C-a*, Školska knjiga, Zagreb,1995.	5	x
	N. Lipljin: *Programiranje/1*, TIVA Tiskara Varaždin, 2004.	5	x
	M. Tudor: *Osnove primjene računala*, Faculty of Maritime Studies – University of Rijeka, 2003.	5	

Optional literature (at the time of submission of study programme proposal)	1. B. V. Liengme: *A Guide to Microsoft Excel 2013 for Scientists and Engineers*, Elsevier Ltd., 125, London Wall, EC2Y 5AS UK, ISBN: 978-0-12-802817-9 2. D. Grundler: *Primijenjeno računalstvo*, Graphis, Zagreb, 2000. 3. T. Zhang: *C in 24 hours*, SAMS Publishing. 4. T. Čukman, V. Bolt: *C/C++ kroz primjere*, Procon, Zagreb, 1993.
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">MARITIME ENGLISH II</td></tr>
<tr><td>Code</td><td>PFP150</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Tomislav Skračić, MA, senior lecturer</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>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">Familiarisation with, and the use of, frequent language structures and technical and maritime vocabulary. Development of speaking, listening, reading, understanding, writing and cross-cultural skills with special focus on developing communication skills that marine engineers require in future professional environment.</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. In English language, express basic mathematical operations; recognise the material properties; distinguish load from stress and give examples; name the basic properties of ferrous and non-ferrous metals used in marine engineering.
2. Name the types of marine propulsion; compare the internal and external combustion engines. Name the basic types of marine fuels and elements of the fuel system. Compare the operation principle of the gasoline and diesel engine. Categorise diesel engines according to basic parameters (stroke, speed, cylinder arrangement, with / without the crosshead, with / without the gearbox…).
3. Explain the operation mode and difference between two-stroke and four-stroke engines. Name essential components of marine engines.
4. Explain the steam cycle and operation principle of steam turbines; name essential elements of steam boilers; explain the difference between watertube and firetube boilers and their application on board.
5. Describe the engine room layout and arrangement; explain the difference in operation principle between the traditional engine room and the fully automated engine room (UMS). In English language, interpret and provide information about the above topics in oral and written form.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures
1. Physical and mechanical material properties.
2. Stress and strain. Material testing.
3. Ferrous and non-ferrous metals. Copper, zinc, aluminium. Alloys.
4. Marine propulsion. Internal and external combustion engines.
5. Marine propulsion. Fuels and bunkering.
6. Types of diesel engines – categorisation according to various criteria.
7. Technical terminology. Grammar structures.
8. Operation of two-stroke and four-stroke engines.
9. Basic elements of two-stroke and four-stroke engines.
10. Essential stationary and running parts of engine. Steam reciprocating engine and basic steam cycle.
11. Steam generation. Water-tube boilers – operation and categorisation.
12. Elements of a boiler: burner, regulators, pumps, condensers...
13. Fuel system.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">14. Engine room arrangement. Traditional and UMS operation. Control room.
15. Review.

Exercise

1. Use of numbers and symbols. Expressing values and quantities. Expressing basic formulae and mathematical operations.
2. Diagram interpretation.
3. Ferrous and non-ferrous metals. Iron production. Copper, zinc, aluminium. Alloys. Modal verbs.
4. The Passive Voice (use).
5. The Passive Voice (forms according to Tenses).
6. Review of forms and tenses.
7. MIDTERM test 1.
8. Operation of two-stroke and four-stroke engines.
9. Basic elements of two-stroke and four-stroke engines. Definite and Indefinite Articles.
10. Essential stationary and running parts of engine. Their position and function. Steam reciprocating engine and basic steam cycle
11. Steam generation. Water-tube boilers. Prepositions of place and time. Adverbs of frequency and manner.
12. Elements of a boiler. Making comparison.
13. Fuel system diagram. Compounds. VIDEO & Exercise: “Massive engines of ships”.
14. Engine room operation. Reading and using numbers, figures, symbols and basic mathematical operations (Review).
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
☒ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">All students are expected to attend lectures and exercises regularly, to be active in class, and to take midterm exams or, alternatively, the final exam. Students apply for examination through the on-line service (“Studomat”).
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 + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, 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 50% of class attendance cannot take the exam and 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 (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, i.e. additional individual workload. Students whose absence has not been justified (employment, apprenticeship, illness…) cannot take the exam and have to re-register the course in the following academic year.</td></tr>
<tr><td>Screening student work (name the</td><td>Class attendance</td><td>0.75</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		Activity in class	0.5
	Essay		Seminar essay		(Other)	
	Midterm tests	1.75	Oral exam		(Other)	
	Written exam		Project		(Other)	

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

Students can pass the exam by taking **two midterm exams** during the semester. In the examination period, they can re-take the midterm exam that they missed or failed. If a student has actively participated in class, he/she does not have to take the **oral exam**. Students shall take the oral exam in case of insufficient activity in class or if they do not agree with the final grade the teacher has suggested and would like to achieve a higher grade. The final grade comprises the class attendance, results of the midterm tests or the final exam, and the **activity in class**.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Attendance	80	25
Active participation in class	80	16.66
Midterm I	50	29.16
Midterm II	50	29.16

Final assessment

Assessment tools – final exam	Performance (min. %)	Participation in the final grade (%)
Written exam	50	50
Oral exam	50	30-50
Previous activities	80	0-20

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)

The same assessment and grading criteria apply to full-time, part-time and incoming Erasmus+ students.

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

Title	**Number of copies in the library**	**Availability via other media**
Spinčić, A., *An English Textbook For Marine Engineers I.*, 3rd amended ed., Faculty of Maritime Studies in Rijeka, 2008.	20	yes
Skračić, T.: PowerPoint presentations available at Merlin e-learning platform.	-	yes

	Luzer, J., Spinčić, A., *Gramatička vježbenica engleskog jezika za pomorce*, 3rd ed., Faculty of Maritime Studies in Rijeka, 2003.	5	yes
Optional literature (at the time of submission of study programme proposal)	1. Spinčić, A., Luzer, J. *Engleski u brodostrojarskim komunikacijama – English in marine engineering communications*, 3rd amended ed., Adamič, Rijeka 2007. 2. Plančić, Bisera; Skračić, Tomislav: *Englesko-hrvatski pomorski rječnik / English-Croatian Maritime Dictionary*, Faculty of Maritime Studies in Split, 2017. 3. Kluijven, P.C. van, *The International Maritime Language*, Programme, Alk & Heinen Publishers, Alkmaar, 2003, The Netherlands.		
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">PHYSICAL EDUCATION II</th></tr>
<tr><td>Code</td><td>PFP147</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Mislav Lozovina, PhD, associate professor</td><td>Credits (ECTS)</td><td colspan="5">1</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></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="5">/</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Training students to perform self-exercise at work or adequate training ground on board the vessel where he/she lives and works. Enabling students to select the type and load of exercise, especially for the muscle clusters that are at risk in the workplace. Raise an awareness of the importance of maintaining the health and fitness in the seafaring population through workout and development of basic and specific motor skills, e.g. rope and ladder climbing, rescue of a drowning person, swimming and rowing. Use adequate kinesiological activities for increasing adaptive and creative abilities under modern living and studying conditions. In addition, providing general information on health and working and self-defence abilities that are necessary in life.</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. Acquire general and specific motoric abilities, skills, knowledge and habits.
2. Perform motoric tasks in emergencies. Recognize the factors resulting in injuries and illness.
3. Adjust the exercises and techniques to one's own abilities.
4. Apply the acquired knowledge, skills and motoric habits to self-exercise at work.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">This course is performed on various premises: in a gym, at a pool, and at sea. The weather conditions affect the amount of rowing hours. The harmonisation of the faculty timetable and the pool timetable affects the amount of swimming hours. Fair weather allows increased activities at sea. Physical exercises in the gym are focused on maintaining the good health and fitness of students and seafarers.
Part-time students can write a seminar paper. The course program is designed to enable a student to achieve the psycho-physical shape that is sufficient for normal performance of the job and professional tasks. Exercises include the natural motions, shaping exercises, swimming, rowing and diving.
1. Jump, take-off and landing while running on board and developing awareness of possible injuries. Running towards the muster point. Ascending and descending the companionway. Work, fatigue, rest. Climbing up and down the ladders. General and specific physical fitness of the seafarer. Seafarer's explosive power and reactions in the event of onboard accident. Flexibility and body balance. Accuracy. Movement speed. Weight lifting. Typical regular and irregular motions. Breathing exercise. Pectoral and abdominal breathing. Testing the motoric abilities and functionality of the body. Life-boat rowing, in line with individual abilities.
2. Code of conduct at the pool. Jumping into water, getting out of water, swimming test. Rescuing and retrieving a person from the water in case of likely drowning, and rendering first aid. Maintaining health through physical exercise. Measuring</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">the heart beat when resting, after load (running) and after recovery (2 minutes after running). Swimming skills. Ways of jumping off board. Diving under an imaginary ignited oil spill. Emerging to the surface in case of ship accident. Swimming techniques: gliding, floating, breathing, movement of arms and legs, correction of typical errors. Swimming exercise in case of various spinal pains. Swimming exercise aimed at synchronisation of breathing and movements of arms and legs. Free diving: time and length. Rescuing a drowning person. Careful approach to the drowning person. Gripping the drowning person. Ways of suffocating in the sea and fresh water. Putting the isothermal suit on. Getting out of water, opening the life raft, boarding the raft or boat, turning the life raft upright, jumping into water and swimming using a life jacket, jumping into water and swimming using isothermal suit, diving, survival in water.
3. Fundamentals of kinesiological transformation – the gym allows training activities that allow students and seafarers to carry out exercises and psycho-physical shape that is sufficient for proper performance of their jobs and professional tasks.
4. Rowing techniques. Retrieving and carrying an oar. Proper trimming of the cutter: by the stern and the bow, to the port and starboard. Synchronisation of rowing. Starting position of the arms, body, legs and oars. Active and passive phase of rowing. Rowing at the bow, amidships and at the stern. Basic rowing motions: short, medium, long and strong. Race rowing: start, turn, finish.
A note on ROWING:
Cutters and/or boats are used for rowing activities. Classes are held on Saturdays and Sundays so that the part-time students can meet this requirement. Classes can be also attended by full-time students. Part-time students may opt for a seminar paper instead.</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
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:
Records of student attendance are kept as attending exercises is compulsory. At least 80% of attendance is required. In case of a student's insufficient attendance, it is considered that the obligations have not been completed and the student has 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.</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>0.25</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">There are no grades in this course. Students obtain 1 ECTS credit by meeting attendance requirements.</td></tr>
</table>

<table>
<tr><td></td><td>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>Class attendance</td><td>80</td><td>100</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td>Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td>Lozovina V.: Sportovi na vodi, University of Split, 2001.</td><td>25</td><td>Yes</td></tr>
<tr><td>Zec, D.: Sigurnost na moru, Faculty of Maritime Studies in Rijeka, 2001.</td><td></td><td></td></tr>
<tr><td>Lozovina V., Lozovina M. (2012): Theory and mathematical modulation of sports training, Paradigm of Methodological Theory and Mathematical Modulation of Sports Training, LAP LAMBERT Academic Publishing, Saarbrücken, Germany, ISBN: 978-3-659-24998-3.</td><td></td><td></td></tr>
<tr><td>Bompa, T., Buzzichelli, C. (2015): Periodization training for sports, Human Kinetics Publishers, Champaign, United States, ISBN10: 1450469434, ISBN13: 9781450469432.</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"></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">MATHEMATICS II</th></tr>
<tr><td>Code</td><td>PFP112</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">Matko Maleš, 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="5">10</td></tr>
<tr><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Basic knowledge of the mathematics areas (fundamentals of algebra, mathematical analysis and corresponding mathematical methods) that are necessary for studying and student performance in other courses within the curriculum, and for the expected application in practice.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course Mathematics I previously taken.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Define a primitive function and calculate an infinite integral;
2. Interpret the methods of integration and apply the Newton - Leibniz formula to solving definite integrals;
3. Recognize and solve improper integrals;
4. Apply definite integrals in calculating the surface area, arc length, volume and surface of rotation bodies;
5. Analyse and solve problems through the functions featuring two or more variables;
6. Interpret and explain the meaning of the solutions of the differential equations of the first and second orders.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:

1. Introduction.
2. Infinite integrals. Methods of integration.
3. Integration of rational and some irrational functions.
4. Integration of trigonometric functions. Definite integrals and their properties.
5. Relations between definite and infinite integrals, the Newton - Leibniz formula. Improper integrals.
6. Application of a definite integral: calculation of the surface of figures in a plane. Calculating the curve’s arc length.
7. Calculation of the volume and surface of rotation bodies.
8. Function with a set of variables. Definition, limit, continuity and graphic layout. Partial derivations.
9. Total differentials of the function. Partial derivations of complex functions.
10. Extremes of functions with a couple of variables: ordinary extremes, conditional (related) extremes.
11. Differential equations of the first order: differential equations with separated variables.
12. Homogeneous, linear, Bernoulli and exact differential equations.
13. Differential equations of the second order which come down to differential equations of the first order.
14. Linear differential equations of the second order with constant coefficients: homogeneous and non-homogeneous linear differential equations of the second order with constant coefficients.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">15. Review. Overview of the entire course and presentation of the most important facts necessary for passing the exam.

Exercises:

1. Elementary integration.
2. Methods of integration.
3. Integration of rational functions and some irrational functions.
4. Integration of trigonometric functions.
5. Relations between definite and infinite integrals: substitution in a definite integral. Partial integration in a definite integral. Improper integrals.
6. Application of a definite integral: calculation of the surface of figures in a plane. Calculating the curve’s arc length.
7. Calculation of the volume and surface of rotation bodies.
8. Function with a set of variables. Definition, limit and graphic layout. Midterm test No. 1.
9. Partial derivations. Total differentials of the function. Partial derivations of complex functions.
10. Extremes of functions with a couple of variables: ordinary extremes, conditional (related) extremes.
11. Differential equations of the 1st order: differential equations with separated variables.
12. Homogeneous, linear, Bernoulli and exact differential equations.
13. Differential equations of the 2nd order which come down to differential equations of the 1st order.
14. Linear differential equations of the 2nd order with constant coefficients: homogeneous and non-homogeneous linear differential equations of the 2nd order with constant coefficients.
15. Midterm test No. 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
☒ 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 (two partial exams) during the semester. In case of passing both 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 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>Screening student work (name the</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td></td></tr>
</table>

<table>
<tr><td rowspan="4">proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Experimental work</td><td></td><td>Report</td><td></td><td>(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>3.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></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">
Every student has to take the written test.
The written part of the exam consists of two partial exams (midterm tests) that are held in the 8th and the 15th week of the semester. Alternatively, a student can take the final exam that takes place in the examination period.
A student has to achieve at least 50% of points to pass a midterm exam. In case a student passes both midterm exams, he/she does not have to take the final exam. If a student has passed just one midterm exam, he/she will take the final exam covering only the area that he/she failed to pass. 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.

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>Attendance</td><td>80</td><td>30</td></tr>
<tr><td>Midterm test No. 1</td><td>50</td><td>35</td></tr>
<tr><td>Midterm test No. 2</td><td>50</td><td>35</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>
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="2">Title</td><td>Number of copies in the library</td><td colspan="2">Availability via other media</td></tr>
<tr><td></td><td colspan="2">Merlin; https://moodle.srce.hr/2021-2022/ MareMathics; https://maremathics.pfst.hr/</td><td>-</td><td colspan="2">yes</td></tr>
<tr><td></td><td colspan="2">Demidovič, B. P.: Zadaci i riješeni primjeri iz matematičke analize za tehnički fakultete, Zagreb, 1995.</td><td>15</td><td colspan="2">yes</td></tr>
<tr><td></td><td colspan="2">Group of authors: Matematika II dio [Mathematics – part 2], Faculty of Maritime Studies in Rijeka, 1993.</td><td>6</td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"></td><td></td><td colspan="2"></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)	1. Apsen, B.: *Riješeni zadaci više matematike 2*, Tehnička knjiga, Zagreb, 1991. 2. Uščumlić, M.; Miličić, P.: *Zbirka zadataka iz više matematike I*, Naučna knjiga, Beograd, 1989. 3. Kurepa, S.: *Matematička analiza 1. sv.*,Tehnička knjiga, Zagreb, 1970.
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 STEAM GENERATORS AND HEAT TURBINES</td></tr>
<tr><td>Code</td><td>PFS210</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Joško Dvornik, PhD, full professor with tenure
Nikola Račić, PhD, full professor with tenure</td><td>Credits (ECTS)</td><td colspan="4">7</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>F</td></tr>
<tr><td>60</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">The acquired knowledge and skills will enable students to perform of all tasks at the operational and management levels and to understand the processes of onboard steam generators and heat turbines, their features and designs, in order to be able to make preparations and run the plant.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course “Thermodynamics and heat transfer” previously taken and the exam passed.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Analyse the categorisation and main characteristics of the ship's steam generators.
2. Assess the thermodynamic process in the steam generator, heat transfer and change in conditions in individual components.
3. Define and calculate combustion, calculate the combustion air amount, products of combustion, combustion process control. Analyse the fuel-air ratio, circulation of air and fumes, circulation of water, steam separation, fuel supply system, feed water system. Sketch and analyse the system of control and protection of steam generators.
4. Define and analyse the heat balance of the steam generator, heat loss, efficiency, fuel consumption.
5. Distinguish and compare the main types of ship's steam generators, explain the preparation of the steam generator, maintenance, inspection and conservation.
6. Analyse the purpose of the heat turbines, their categorisation, main characteristics, heat processes and effects on parameters on the efficiency of marine heat turbines.
7. Define and analyse the types and parts of the steam turbines, steam flow in the turbine, optimisation of efficiency, the water heating and de-aeration systems, lubrication oil system.
8. Analyse the system of the turbine's control and protection.
9. Analyse heat processes in gas turbines.
10. Analyse the main parts of the gas-turbine and combine gas-steam turbine plant, and describe the preparation of heat turbines, their maintenance, inspection, failures, and servicing the running plant.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction, development of marine steam generators. Their purpose, categorisation, main features, thermodynamic fundamentals of steam generators. The main components. Fundamentals of thermodynamics. Steam plant processes. Heat transfer in the steam generator. Fuel and combustion. Properties of liquid fuels. Interactions in the process of combustion, fresh air volume, products of combustion.</td></tr>
</table>

	2. Heat balance. Heat flows in the steam generators. Heat efficiency and losses. Fundamentals of the heat calculation. Heat exchange by radiation. Calculation of the furnace and convective heat surface. 3. Circulation of water in steam generators. Natural and forced circulation. Circulation of air and fumes. Natural and forced ventilation. Main construction elements of the steam generator. Evaporation surface, superheaters, feed water heaters, air heaters. 4. Steam generator equipment: blocking devices, regulators, safety and control devices, rough fittings in the steam generator. Fuel supply system. Fuel atomisation, fuel burners, fuel treatment and supply equipment. 5. Feed water system. Preparation and treatment of the feed water: systems and processes. Malfunctions in the feed water system. Construction of the marine steam generators. Cylindrical firetube auxiliary steam generators. Watertube steam generators of the “Integral” class. Steam generators of the “D” class, steam generators featuring membrane evaporating tubes. 6. Exhaust gas driven steam generators. Basic ways of connecting utilisers. Automatic regulation of the steam generator. Regulation of the load, burner control system, feed system, excessive temperature. 7. Construction materials for steam generators. Failures and damages: cracks, leaks, outer and inner corrosion in tubes. Running and maintenance of the marine steam generators. 8. Running and maintenance of the marine steam generators: preparation for starting, reaching the working pressure, plant control, malfunctions, shut-down, inspection and cleaning. Economical running of the steam plant. Heat loss in exhaust gases, burning process control, losses due to fuel/air ratio, effects of load on the plant performance. Possibilities of upgrading the marine steam plants. 9. Introduction, comparison of propulsion plants: diesel engine, steam turbine, gas turbine. Rankine-Clausius heat process. Heat process of the steam turbine, effects on parameters on the efficiency, interheating, and multiple-stage expansion. 10. Types of steam turbines. Steam streaming in the turbine, steam turbine output, efficiency optimisation. Energy loss within the steam turbine. Steam consumption and distribution of heat energy consumption. Regeneration heating of the feed water. 11. Designs of marine steam turbines: one-stage action with step steam flow rate, multi-stage action with step steam pressure rate, multi-stage reaction turbine, combined turbines. Components of the steam turbine; nozzles, blades, rotor, glands and seals, bearings, casing, joints. 12. Components of the steam plant: gearbox, rotor reversing device, condenser, water heating and de-aerating system, lubrication oil system. System of the steam turbine's control and protection: control of output, speed, speed limit and overspeed trip, output measurement system. 13. Gas turbines; open process in the gas turbine, air heating after compression, two-stage expansion, two-stage compression and expansion. Main parts of the gas-turbine plant: gas turbine, combustion chambers, combustion air heaters, fuel supply system. 14. Combined steam and gas propulsion plants. Fundamentals of proper operation of the marine heat turbines: preparation, heating and starting. Gas turbine fuels. Maintenance and operation of the gas turbine plant. Maintaining vacuum in the condenser. Condensate control, drain control, lubrication control. 15. Guidelines for operating the steam-gas turbine plants. Stand-by maintenance. Plant shut-down. Remote control of the turbine plant. Failures in turbines and condensers. Turbine vibration, water hammer in the turbine, blade faults, damage to the casing and turbine wheel, faults in turbine bearings, gearbox, condenser. **Exercises:** 1. Calculation of the minimum air ratio needed for complete combustion of fuel

<table>
<tr><td></td><td colspan="6">having specific chemical properties. Real amount of air required for combustion, products of combustion, exhaust gas content, heat contained in exhaust gases.
2. Calculating the necessary amount of fuel, calculation of the furnace.
3. Calculation of the steam generator’s heat surface.
4. Feed system management, water drain from the steam generator and refilling the system.
5. Management of the fuel and air systems, starting the steam generator, burner control.
6. Heating the steam line, analysis of the generator’s operating parameters.
7. Controlling the running generator, load increasing and decreasing, sootblowing and scuming procedures. Procedures taken in case of the steam generator breakdown, feed water control.
8. Visiting the engine room of the m/v Petar Hektorović. Familiarisation with the heavy fuel oil warm-up system, monitoring the plant operation.
9. Defining forces at the rim of the turbine wheel, work and power at the turbine shaft. Measuring the turbine rotor’s diameter. Rate of streaming and heat drop in the turbine.
10. Determining the height of the turbine rotor blades, rate of reactivity and speed triangles.
11. Determining the overall efficiency of the turbine plant, power at the turbine shaft, specific steam consumption, specific consumption of fuel, sea water flow through the condenser.
12. Unit work of the gas turbine, fuel consumption, rate of efficiency.
13. Tour of the turbine plant, attendance when starting the turbine, during its operation and when shutting the plant down.
14. Familiarising with the steam turbine systems for driving the generators.
15. Tour of the steam turbine plant and the gas turbine for driving generators.</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. In order to take the exam, full-time students have to achieve at least 80% of class attendance in lectures and 100% in exercises. Insufficient attendance 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 take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. If a student fails both midterm exams, he/she has to take the complete exam (written and oral).

Obligations of part-time students:
Their overall obligations cannot be less than 50% with regard to full-time students.</td></tr>
<tr><td rowspan="4">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>1.875</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>(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>5.125</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
</table>

<table>
<tr><td>equal to the ECTS value of the course)</td><td colspan="6">
<table>
<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 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 6-10 and is held in the 14th week of the semester. Examples of the tests are available on the faculty's web-site. 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 or the final written test, and the result of the oral examination. Students who have fulfilled the course obligations but have failed or missed 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 of students:
<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>26.78</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>36.60</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>36.60</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>
Assessment and grading of part-time students:
The same grading and evaluation criteria apply to both full-time and part-time students. The exam cannot be taken by a full-time student with less than 80% of attendance in classes, nor by a part-time student with less than 50% of attendance.
</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>Prelec, Z.: Brodski generatori pare, Školska knjiga Zagreb, 1996.</td><td></td><td></td></tr>
<tr><td>Tirelli, E., Martinović, D.: Brodske toplinske turbine, Faculty of Maritime Studies in Rijeka, 2001.</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 colspan="6">
1. Šneller, S.: Pogon broda I, University of Rijeka, FSB, 1996.
2. Šneller, S., Parat, Ž.: Pogon broda II, University of Zagreb, FSB, Zagreb, 1996.
</td></tr>
<tr><td>Quality assurance methods that ensure the</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</td></tr>
</table>

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="6">MARINE AUXILIARY ENGINES AND MACHINERY</td></tr>
<tr><td>Code</td><td>PFS211</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, 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>60</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 operation of marine auxiliary engines and machinery. The acquired knowledge and skills will enable the students to carry out any task at the operational and management level.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course “Technical mechanics II” taken previously.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Explain the design, construction and way of operation of specific shafting designs.
2. Define the main features of the ship's pumps. Explain the design, construction and way of operation of the specific marine pump designs.
3. Define the main features of the marine compressors and fans. Explain the design, construction and way of operation of the specific marine compressor and fan designs.
4. Define the main features and the way of selecting the marine strainers and filters. Explain the design, construction and way of operation of the individual marine strainers and filters.
5. Explain the design, construction and way of operation of the ship's steering gear and deck equipment.
6. Define the main features and the way of calculating and selecting the marine heat exchangers and pipelines.
7. Explain the design, construction and way of operation of the marine environment protection equipment.
8. Define the procedures in the event of sea pollution.
9. Explain the design, construction and way of operation of the ship's safety equipment.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures and exercises:

1. Introduction, shafting, intermediate shafting, propeller shaft.
2. Thrust bearing, shaft coupling, stern-tube and glands, bearings.
3. Auxiliary boilers. Sampling and analysis of the feed water, interpretation of the results, boiler water treatment.
4. Power drive, gears and couplings, ship's propeller. Pipelines. Ship's pumps: introduction, categorisation.
5. Pump drive and control, onboard use of pumps, special requirements. Energy conversion, pump's supply height, efficiency, inlet/suction height, cavitation.
6. Reciprocating, air and centrifugal pumps.
7. Rotation volumetric pumps; screw / gear / blade pumps. Compressors and fans: introduction.
8. Processes in the compressor, multi-stage compressors, compressor components. Operation of the compressor, separation of condensate and oil, malfunctions, automatic operation of the compressor. Compressors in the cooling systems.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">9. Fans, selecting the fans, designs and construction. Strainers and filters: introduction.
10. Separation of liquids and solid particles. Categorisation of centrifugal strainers, designs and ways of operation. Purification of oils by centrifugal strainers.
11. Methods and ways of preventing the pollution of the sea and marine environment from ships. International convention MARPOL 73/78. Oily water purification equipment. Appliances for treating black and grey waters. Devices for purifying exhaust gases from ships. Procedures and equipment used in the event of oil pollution at sea: the ship oil pollution emergency plan (SOPEP) and guidelines under MARPOL.
12. Steering gear mechanism, way of moving the rudder. Hydraulic steering gear, handling of the steering mechanism.
13. Deck equipment: introduction. Onboard cranes and derricks. Warping winch, windlass, windless drive.
14. Heat exchangers, coolers, heaters, condensers, evaporators and de-aerators.
15. Refrigerating plant: introduction. Main components of the refrigerating plant, designs. Air conditioning system.</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:

A full-time student is required to attend 95% of lectures and 100% exercises in order to take the exam and earn ECTS credits. Insufficient attendance has to be compensated by performing additional assignments (seminar papers). Students who have missed classes due to illness must have a valid medical document proving their health issues. Students who have achieved less than 50% of class attendance cannot take the exam and have to re-register the course in the following academic year.
Students can pass the exam by taking two midterm exams during the semester. Students are obliged to take all midterms. In the examination period, they can re-take only one midterm exam that they missed or failed. Students who have failed or missed both midterm tests have to register for the final exam in the examination period. Students who have passed both midterm exams are 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. Attendance in exercises has to be 100%. Insufficient attendance has to be compensated by performing additional assignments (seminar papers).
Students who have missed classes due to illness must have a valid medical document proving their health issues. Part-time students who have achieved less than 20% of class attendance cannot take the exam and have to re-register the course in the following academic year.

The student shall not receive a certificate of fulfilment of the conditions for obtaining the Certificate of Additional Competence (according to regulations of Croatia’s Ministry of the Sea, Transport and Infrastructure) if he was not present for more than 5% of the total duration of the training program and if he did not attend the practical part of the training in its entirety.</td></tr>
</table>

<table>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.875</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>(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>4.125</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:

There are two midterm written tests in the semester, which are held upon completing the respective course modules. A student has to achieve at least 50% of points to pass a midterm exam. A student who has passed both midterm tests does not have to take the final written / oral exam. His/her grade is entered in the on-line service “Studomat” in the examination period, upon applying for the exam through the online service. Success on a midterm exam is recognised as a partial pass on the final exam. The remaining part of the course matter can be evaluated on the practical and theoretical tests. Exams can be taken only be the students who have met the course requirements (attendance in class and 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>Class attendance</td><td>80</td><td>26.78</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>36.60</td></tr>
<tr><td>2nd midterm test</td><td>50</td><td>36.60</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 rowspan="4">Required literature (available in the library and via other media)</td><th colspan="4">Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td colspan="4">Ozretić, V.: Brodski pomoćni strojevi i uređaji, Split Ship Management, Split, 2004.</td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study</td><td colspan="6">1. D. Martinović: Brodski rashladni uređaji, Faculty of Mechanical Engineering and Naval Architecture, Zagreb, 1994.</td></tr>
</table>

programme proposal)	2. H. D. McGeorge: *Marine Auxiliary Machinery*, Butteworth-Heinemann, Oxford, 2002. 3. D. A. Taylor: *Introduction to Marine Engineering*, Elsevier Butterworth-Heinemann, Oxford, UK, 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)	In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">MARINE ENGINE ELEMENTS</td></tr>
<tr><td>Code</td><td>PFS110</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teachers</td><td>Ladislav Stazić, PhD</td><td>Credits (ECTS)</td><td colspan="5">7</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>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="5">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Acquire basic knowledge on types, load, design, dimensioning, material, drive load, calculation procedures and exploitation features of the engine components and constructive parts, particularly the components of marine engine systems and maritime constructions.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Requirements for this course enrolment include:
• Course “Technical mechanics I” previously taken and regularly attended.
• Course “Technical mechanics II” previously taken and regularly attended.
• Course “Graphic drawing in marine engineering” previously taken and regularly attended.
• Course “Strength of materials” previously taken and regularly attended.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Explain the notions, purpose and categorisation of engine elements.
2. Describe and analyse the types of load, safety, application and reliability of the marine engine elements and the parts of maritime constructions under static and dynamic loads.
3. Explain the construction and technological characteristics of the elements designed for connecting engine components, elements for transferring power and motion, and pipeline elements.
4. Define the ways of calculating and sketch the elements for connecting (welds, soldered pieces, screw connections, tightened pieces, bolts, studs, wedges, springs).
5. Define the ways of calculating and sketch the elements for the transfer of power and motion (pins, shafts, journals, bearings, gears and gear drives, belt and chain drives, couplings).
6. Define the ways of calculating and sketch the elements of pipelines (pipes and plugs / shutters / flaps).
7. Apply the acquired knowledge in solving concrete tasks within marine engineering practice and make necessary conclusions.</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: course objectives, course enrolment requirements, learning outcomes, exercise contents, student requirements and absenteeism, midterm and final exams, final remarks, literature and other sources.
2. Introduction to the course. Basic notions and categorisation of the engine elements and normization. Technical systems in general engineering. Construction as a process. Categorisation of engine elements. Standards and normization systems.
3. Load, stress, strength and safety. Loads on engine elements and construction components. Static loads, static properties of the components and safety. Dynamic load and stress. Dynamic strength of the engine elements and marine constructions: fatigue and dynamic strength. Wöhler curve. Smith’s diagram. Factors affecting the dynamic strength. Safety of the engine elements and marine constructions: safety under dynamic load. Minimum coefficient of safety.
4. Elements designed for connecting engine components. Welds. Types, materials and quality. Calculation of welds. Welded pressure vessels.
5. Soldered and glued elements. Tightening connections. Cylindrical joints.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">Conical tightening joints.
6. Tightening nuts. Screw connections. Threads. Bolts, nuts and shims. Materials, manufacturing and safety. Securing screw connections. Load and calculation of the screw design.
7. Dowels and wedges. Longitudinal wedges. Profiled shafts. Springs. Leaf springs. Torsion springs. Extension-compression springs. Rubber springs.
8. Shafts and pins. Elements for the transfer of power and motion. Materials and design. Calculation of shafts and pins. Journals. Transverse journals. Longitudinal journals.
9. Bushings. Bearings. Slide bearings. Friction, lubrication and sealing. Designs and materials. Calculation of slide bearings. Roller bearings. Designs and marks. Installation and lubrication. Calculation of roller bearings. Clearance, lubrication and sealing of roller bearings.
10. Couplings and clutches. Non-elastic, rigid, dilatation, elastic, accumulation and damping, geared, friction clutches, Periflex and Bibby clutches. Oldham, viscous fluid clutch, special, safety clutches.
11. Mechanical transmission. Gears and gear drives. Types and features. Involute toothing. Materials and design. Spur gears. Profile correction. Shaft forces and loads. Single helical, double helical, bevel and worm gears. Gear capacity. Tooth root capacity. Tooth flank capacity. Gearing in marine propulsion system.
12. Belt drives. Tightening the belt. Materials and designs of belts. Calculation of transmission. Chain drives. Advantages and disadvantages. Construction designs. Lubrication and maintenance. Calculation of transmission.
13. Cylindrical gears. Construction designs and basic dimensions. Involute toothing. Materials and design. Spur gears. Profile correction. Shaft forces and loads. Single helical, double helical, bevel and worm gears. Gear capacity. Tooth root capacity. Tooth flank capacity. Forces and shaft loads.
14. Single helical, double helical, bevel and worm gears. Materials and designs. Dimensions of worm gear and worm wheel. Gear capacity. Tooth root capacity. Tooth flank capacity. Forces and shaft loads.
15. Elements of the pipeline. Materials, connections and calculations. Valves, plugs, shutters, flaps, cocks.

Exercises:

1. Types of load and stress in marine engine elements.
2. Elements designed for connecting engine components. Welds.
3. Welds.
4. Soldered and glued elements. Tightening elements.
5. Assignment of the program task (seminar paper).
6. Screw connections (1). Threads, bolts, nuts and shims.
7. Screw connections (2). Threads, bolts, nuts and shims.
8. Dowels, wedges, springs.
9. Elements for the transfer of power and motion. Shafts and pins.
10. Journals, bushings, bearings.
11. Couplings and clutches.
12. Mechanical transmissions. Geometry and dimensions of the gear drives.
13. Strength of the gear drives.
14. Belt and chain drives.
15. Submission of the assigned program task (seminar paper).</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>
</table>

Student responsibilities

Obligations of full-time students:

A full-time student is required to attend at least 90% of lectures and 100% of exercises, as well as to carry out the assigned program task (seminar paper), in order to take the exam and earn ECTS credits. Insufficient attendance (justified absence up to 20%) has to be compensated by performing additional assignments, 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 50% of class attendance cannot take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. The theoretical and numerical part of each midterm exam are considered as separate units. If a student fails both midterm exams, he/she has to take the complete exam (theoretic and numeric). A short oral exam for students who meet all the above-mentioned obligations is held after passing the theoretical and numerical part, immediately before entering the grade.

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-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	1.875	Research		Practical training	
Experimental work		Report		Program assignment	1.025
Essay		Seminar essay		(Other)	
Midterm tests	4.100	Oral exam		(Other)	
Written exam		Project		(Other)	

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

Continuous assessment of students (both full-time and part-time)

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance	80	0
Program assignment	100	20
1st Midterm test	50	40
2nd Midterm test	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)

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)	Z. Kulenović, N. Vulić: *Elementi brodskih strojeva i pomorskih konstrukcija*, Faculty of Maritime Studies – University of Split, 2020.		No.
	Kulenović Z., *Reduktor - Uputstvo za proračun* (internal script), Faculty of Maritime Studies – University of Split, 2014.		No.
	Kraut, B.; *Krautov strojarski priručnik* (10th ed.), Axiom, Zagreb, 1997.		No.
Optional literature (at the time of submission of study programme proposal)	1. Meerkamm, H. (ed.); Schaeffler Technical Pocket Guide, Schaeffler Technologies GmbH & Co. KG, Herzogenaurach, 2014. 2. K. H. Decker: *Elementi strojeva*, Golden marketing – Tehnička knjiga, Zagreb 2006. 3. Z. Kulenović: *Tehničko crtanje*, University of Split, Faculty of Maritime Studies, 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)	Learning materials are continuously published and updated on Merlin e-learning platform.		

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">SHIP STRUCTURAL DESIGN</td></tr>
<tr><td>Code</td><td>PFS119</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">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"></td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The goal of the course is to familiarise students with basic dimensions and measures of vessels, construction elements of vessels, basic notions of vessel's strength, construction features of various vessels, and international regulations regarding the construction.</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. Describe and explain the development of boats and ships throughout history, and familiarise with the international regulations on the construction of vessels.
2. Explain and analyse the ways and types of boatbuilding and shipbuilding, elements of longitudinal and transverse strength of vessels and familiarise with the structural elements of a vessel.
3. Describe and explain cargo systems and ship cargo handling equipment.
4. Analyse and use basic measures and dimensions of vessels.
5. Understand and use various ships' layouts and outlines.
6. Describe and explain the categorisation of vessels in accordance with various criteria.
7. Define and explain the categorisation of vessels according to: purpose, type of cargo, navigation categories, building material, service trade, etc.
8. Define and explain technical and technological features of various vessels.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction. International regulations on construction of vessels; historical development of vessels.
2. Ship building. Building materials, welding, bulkheads and partition of a vessel. General information on corrosion, anti-corrosion protection. Basic features of time and water-tight doors, components and technologies.
3. Ship building. Types of construction, elements of longitudinal and transverse strength of the vessel's structure, structural elements of ships and boats, types of tanks and equipment, classification goals and periods, specification of repairs and addressing malfunctions during overhaul.
4. Strength and stress of vessel's construction. Classification and basic notions of the ship construction strength and stresses. Transverse forces and bending moments. Hogging and sagging. Fundamentals of vibrations, classification and causes, possible damages to the vessel’s construction due to vibration.
5. Layout of onboard space. Arrangement and characteristics of cargo spaces, tanks, accommodation area, navigating bridge and engine room.
6. Cargo systems. Various technologies of cargo ships: dry cargo carriers, tankers, special purpose vessels.
7. Cargo handling equipment onboard the vessel. Features of cargo handling gear. Masts, derricks, cranes, stresses, operation of the deck crane.
8. Ship's machinery and equipment. Features of various equipment and devices on board: windlass, warping winch, mooring gear, other onboard systems.
9. Types of rudder and propeller. Various types of rudders and their characteristics, propeller designs, features of various propeller types, propeller</td></tr>
</table>

geometry, cavitation, alternative forms of the rudder and propeller, bow propeller, resistance, waves, effects of resistance on fuel consumption.
10. Geometric layout of the vessel. Principal dimensions and measures. Length, breadth, freeboard, airdraft, draft. Coefficient of the ship's form, ratio of principal dimensions, values applying to various vessels. Draft marks and reading, fresh water allowance (FWA) and tons per centimetre immersion (TPC).
11. Geometric layout of the vessel. Principal dimensions and measures. Gross register tonnage (GRT), net register tonnage (NRT), deadweight tonnage (DWT), displacement, freeboard, freeboard marks, tonnage marks.
12. Outlines of vessels and vessel's lines, general layout of ships that are different from the technological standpoint, calculation of the surface and volume, centres of gravity, waterlines, ribs and frames, diagonals.
13. Categorisation of vessels according to: purpose, type of cargo, waters they ply, navigation categories, building material, service trade. Vessels using modern technologies.
14. Construction and technological features of dry cargo carriers, general cargo ships, container ships, bulk carriers. International regulations on construction of vessels and onboard systems.
15. Construction and technological features of liquid cargo carriers, crude oil tankers, product tankers, LNG and LPG ships. International regulations on construction of vessels and onboard systems.

Exercises:

1. Boat building and ship building. Fundamentals of constructing various vessels. Materials, welding, visit to a shipyard.
2. Boat building and ship building. Fundamentals of constructing various vessels. Introduction to structural elements, types of vessels, elements of transverse and longitudinal strength, partitions and bulkheads. A visit to a shipyard.
3. Boat building and ship building. Fundamentals of constructing various vessels. Introduction to structural elements, types of designs, elements of transverse and longitudinal strength, partitions and bulkheads. A visit to a shipyard.
4. Layout of onboard space. Arrangement and characteristics of cargo spaces, accommodation area, navigating bridge and engine room. A visit to vessels in the port or shipyard.
5. Types of rudders, propellers and thrusters. A visit to a shipyard.
6. Cargo space. Cargo systems. Cargo handling equipment onboard the vessel. Features of cargo handling gear. A visit to vessels in the port or shipyard.
7. Cargo space. Cargo systems. Cargo handling equipment onboard the vessel. Features of liquid cargo equipment. A visit to vessels in the port or shipyard.
8. Deck machinery and equipment. Features of various equipment and devices on board: anchors, anchor chains, windlass, warping winch, mooring gear. A visit to vessels in the port.
9. Principal dimensions and measures. Length, breadth, freeboard, airdraft, draft. Draft marks and reading, FWA and TPC. Practical observation. A visit to vessels in the port.
10. Vessels featuring various technologies. Familiarisation with various designs. A visit to vessels in the port.
11. Vessels featuring various technologies. Familiarisation with various designs. A visit to vessels in the port.
12. Vessels featuring various technologies. Familiarisation with various designs. A visit to vessels in the port.
13. Vessels featuring various technologies. Familiarisation with various designs. A visit to vessels in the port.
14. Vessels featuring various technologies. Familiarisation with various designs. A visit to vessels in the port.
15. Vessels featuring various technologies. Familiarisation with various designs. A visit to vessels in the port.

<table>
<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:

A full-time student is required to attend at least 80% of lectures and 100% of exercises in order to take the exam and earn ECTS credits. Insufficient attendance (justified absence up to 20%) has to be compensated by performing additional assignments, 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 take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. If a student fails both midterm exams, he/she has to take the complete exam (written and oral).

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-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="2"><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></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>
</table></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="2">There are two midterm exams in the semester. The first comprises Learning outcomes 1-3 and is held in the 8th week, while the second midterm test comprises Learning outcomes 4-8 and is held in the 14th week of the semester. Examples of the tests are available on-line and at the end of every lecture. 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 or the final written test, and the result of the oral examination. Students who have met attendance requirements but have not managed to pass the midterm tests, 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 of students:

<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>Midterm test I</td><td>50</td><td>40.625</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>40.625</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>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> **Assessment and grading of part-time students:** The same grading and evaluation criteria apply to both full-time and part-time students. The exam cannot be registered by a full-time student with less than 80% of attendance in classes, nor by a part-time student with less than 50% of attendance.

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	P. Komadina: *Brodovi multimodalne prijevozne tehnologije*, Faculty of Maritime Studies in Rijeka, 1998.		
	P. Komadina: *Ro-Ro brodovi*, Faculty of Maritime Studies in Rijeka, 1987.		
	P. Komadina: *Tankeri*, Faculty of Maritime Studies in Rijeka, 1994.		
	J. Uršić: *Čvrstoća broda I, II & III part*, Zagreb.		
	M. Milošević, Š. Milošević: *Osnove teorije broda 1 i 2*, Zagreb, 1981.		
	R. Munro: *Ships and Naval Arshitecture*, Institute of Marine Engineers, London.		
	A. Bosnić: *Osnivanje broda*, Zagreb.		
	V. Grubišić: *Konstrukcija broda*, Zagreb.		
Optional literature (at the time of submission of study programme proposal)	1. Biblioteka pomorskog časnika, sv. 1, sv. 2, sv. 3, sv. 4. 2. Biblioteka Sigurnost na moru. 3. D. J. House: *Cargo Work*, Butterworth-Heinemann.		
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">MARITIME ENGLISH III</td></tr>
<tr><td>Code</td><td>PFP105</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Tomislav Skračić, MA, senior lecturer</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>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">Familiarisation with, and the use of, frequent language structures and technical and maritime vocabulary. Development of speaking, listening, reading, understanding, writing and cross-cultural skills with special focus on developing communication skills that marine engineers require in future professional environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Courses “Maritime English I” and “Maritime English II” previously taken and attended.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. In English language, on a blind map, name EU countries and the most relevant maritime countries across the world. In English language, describe the function, design and other essential features of the cylinder and the crankcase.
2. Recognise different ways of making crankshafts: identify the basic features of the bedplate and main bearings.
3. Explain the role of the connecting rod; differ the connecting rod from the piston rod.
4. Describe the function, material, design and other essential features of the cylinder liner.
5. In English language, describe the function, material, design and other essential features of the pistons and piston rings. Interpret and provide information on the above topics, orally and in writing.</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. Principal countries and nationalities.
2. Cylinder and crankcase. Bedplate.
3. Cylinder and crankcase.
4. Relative Clauses 1.
5. Crankshafts: elements, types, stresses, firing order.
6. Crankshafts, main bearings and shaft alignment.
7. Technical terminology and grammar structures.
8. Connecting rods: material, purpose, main parts.
9. Connecting rods / Piston rods.
10. Cylinder liners. Types of scavenging.
11. Cylinder liners: cooling, lubricating, gauging, stresses, causes of wear.
12. Technical terminology and grammar structures.
13. Pistons. Main parts, designs, cooling.
14. Piston rings. Compression and oil / scraper rings. Gaps and sealing.
15. Review.
Exercises:
1. Principal countries and nationalities.
2. Compound Nouns – exercise.
3. Definite and Indefinite Articles.
4. Compounds. "Wear" as a noun and a verb.
5. Technical terminology and grammar structures. Irregular plural.
6. Relative Clauses 2.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">7. MIDTERM test 1.
8. "Choose" and "choice".
9. "Thus / thereby", "too… to", "enough… to".
10. Expressing the consequence, result, effect.
11. Prepositions indicating location and direction 1.
12. Expressing the Purpose 1: "to + infinitive", "in order to", "so as to".
13. Prepositions indicating location and direction 2.
14. Purpose 2: "so that", "in order that". Gerunds and Infinitives.
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
☒ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">All students are expected to attend lectures and exercises regularly, to be active in class, and to take midterm exams or, alternatively, the final exam. Students apply for examination through the on-line service (“Studomat”).
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 + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, 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 50% of class attendance cannot take the exam and 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 (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, i.e. additional individual workload. Students whose absence has not been justified (employment, apprenticeship, illness…) cannot take 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>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>Activity in class</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>1.75</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>

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

Students can pass the exam by taking **two midterm exams** during the semester. In the examination period, they can re-take the midterm exam that they missed or failed. If a student has actively participated in class, he/she does not have to take the **oral exam**. Students shall take the oral exam in case of insufficient activity in class or if they do not agree with the final grade the teacher has suggested and would like to achieve a higher grade.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance	80	25,00
Active participation in class	80	16,66
Midterm I	50	29,17
Midterm II	50	29,17

Final assessment

Assessment tools – final exam	Performance (min. %)	Participation in the final grade (%)
Written exam	50	50
Oral exam	50	30-50
Previous activities	80	0-20

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)

The same assessment and grading criteria apply to full-time, part-time and incoming Erasmus+ students.

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

Title	Number of copies in the library	Availability via other media
Spinčić, A., *An English Textbook For Marine Engineers II*., 4th amended ed., Faculty of Maritime Studies in Rijeka, 2009.	20	yes
Skračić, T.: PowerPoint presentations available online at Merlin e-learning platform.	/	yes
Luzer, J., Spinčić, A., *Gramatička vježbenica engleskog jezika za pomorce*, 3rd edition, Faculty of Maritime Studies in Rijeka 2003.	5	yes

Optional literature (at the time of submission of study

1. Spinčić, A., Luzer, J. *Engleski u brodostrojarskim komunikacijama – English in marine engineering communications*, 3rd amended ed., Adamič, Rijeka 2007.
2. Plančić, Bisera; Skračić, Tomislav: *Englesko-hrvatski pomorski rječnik / English-Croatian Maritime Dictionary*, Faculty of Maritime Studies in Split, 2017.

programme proposal)	3. Selected articles from web-sites, papers and journals on marine engineering and manuals for operation, maintenance and repair of marine engines and machinery.
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 ENGINES</td></tr>
<tr><td>Code</td><td>PFS201</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, PhD, assistant professor
Nikola Račić, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="4">7</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>60</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">Familiarisation with the basic principles of operation of marine diesel engines, their exploitation, failure detection and repair, efficiency of the plant. Understanding the importance of combustion monitoring, maintenance of marine diesel engines and compliance with international requirements with regard to marine environment protection.</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">Upon attending the course and passing the exam, it is expected that the students will be able to:
1. Understand the basic notion of the internal combustion engine (ICE).
2. Understand the basic principles of operation of the ICE.
3. Identify and explain the main components of the ICE.
4. Understand the exchange of media in the ICE.
5. Distinguish the ways of turbocharging the ICE.
6. Understand the systems of creating internal mixture in the ICE.
7. Define and explain the external characteristics of the ICE.
8. Identify and explain the main maintenance procedures in the main engine.
9. Describe and compare various types of drive based on the ICE.
10. Define and describe the levels of alarm and describe their effect on the operation of the ICE.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction. Historical development of the internal combustion engine (ICE). Definition of the engine. Principle of acquiring power, fundamentals of energy transformations in the ICE. Types of marine propulsions, comparison of efficiency, advantages of slow-speed propulsion engines. Propulsion engine production, designs of modern engines, manufacturers and market supply. Categorisation of diesel engines according to: purpose, speed, stroke, cylinder arrangement, piston action. Design and cycle in diesel 2-stroke and 4-stroke engines. Analysis of basic engine components, especially the piston mechanism.
2. Ideal and real processes in ICE. Analysis of the thermo-dynamic efficiency with regard to the compression rate for various processes of heat transfer. Analysis of the pressure ratio psr/p1 and the compression rate for various processes of the heat supply. Real processes in 2-stroke and 4-stroke engines. Methods of measuring the cylinder pressure, analysis of changes in pressure and temperature. Analysis of the effects of the heat release law on the engine performance. Nominal and effective engine power and efficiency. Engine inhibition. Effective data on various types of marine engines. Influence of the environment on the engine performance. Features of the fixed-pitch propeller</td></tr>
</table>

	and controllable-pitch propeller. Heat balance of the engine. 3. Kinematics and dynamics of the reciprocating mechanism, balancing of the engine, vibrations: basic features of the crankshaft mechanism. Stroke, speed and acceleration of the piston depending on the gear. Display of the harmonious components of the piston acceleration. Forces in the crankshaft gear (pressure forces, inertial translation, centrifugal force). Forces and their balance described by taking an example of one cylinder. Forces described by taking an example of a multi-cylinder engine. Crank angle and firing order. 4. Fuel system in marine engines. Preparation of combustible mixture for diesel engines. Fuel injection systems (conventional, common rail). Supply regulation. Streaming in the cylinder. Combustion chamber design. Turbocharging. 5. Problems related to using heavy fuel oil. Combustion. Effects of various methods of injection. Combustion law. Impact of temperature. Uni-fuel and dual-fuel systems (using natural liquified gas as fuel in 2-stroke and 4-stroke marine propulsion engines). Operation characteristics of the engine. 6. Engine testing. Power, mean pressure, specific fuel consumption. Efficiency. Factors affecting the engine power. Influence of the environment. Load diagram. Fouled hull and heavy propeller. 7. Load characteristics. Speed characteristics. Propeller characteristics. Universal characteristics. Heat balance. Emissions of ICE. Pollutant production. Approach to reducing harmful emissions. Measurement of emissions. Regulations on emission reduction. 8. Electronically controlled engines – fundamentals. Procedures for emergency operation. 9. Engine components. Bedplate: design, causes of cracking, alignment, tie bolts, tightening methods, inspection, main bearings. Crankshaft: designs, construction material, deflection, reference marks on the cranks, oil bores. Bearings: materials, designs, damages, clearance test, installing. Flywheel: function, design. Thrust bearing: function, design, measurement of the clearance, temperature measurement. Frame and columns: design, material, connections, reinforcements, crosshead guide in 2-stroke designs. 10. Cylinder block: design, material, connections. Tie rods: function, design, material, mounting procedure, tightening, problems caused by loose or damaged bolts. Cylinder liner: designs, material, cooling, lubrication. Errors in lubrication – insufficient and excessive oil supply. Running-in of a new liner, wear, effects of excessive wear, wear limits, gauging. Lubricating system: types, designs, drive, timing. Cylinder head: elements, design, maintenance. Exhaust and inlet valves, valve operating gear, causes of failure, repair. Effects of sodium, vanadium and sulphur in fuel, cooling of the valves, valve seat material, exhaust valve rotating principles. 11. Connecting rod: function, material, bearings. Crosshead: function, design, alignment, lubrication. Piston rod: material, design, stuffing box, connection to the piston. Piston: designs in 2-stroke and 4-stroke engines, construction material, cooling, coolant circulation, temperatures occurring on the piston, piston alignment. Piston rings: function, materials, types, running-in, malfunctions and damages – causes and cures, wear measurement, inspection, diagnostics, factors affecting the inspection and maintenance intervals. Safety system for preventing explosion in the crankcase. Under-piston fire-protection system. Camshaft: designs, drives. Exhaust manifold. Scavenge manifold. Fresh air coolers: design, failure diagnostics. Turbocharging system: designs, lubrication, diagnostics. Engine alignment – propeller shaft – stern tube. Vibrations, transverse loads, side supports. Causes of vibration. 12. Marine engine systems: lubricating oil system in 2-stroke and 4-stroke diesel engines, function, elements and lubrication points, oil characteristics. Methods of lubrication of the bearings in marine slow-speed diesel engines. Lubrication of the bearings: effects of bearing clearance, viscosity, speed and oil pressure. Lubrication of the Michell thrust bearing, conditions for oil film forming, typical lube oil pressures. Prevention and consequences of the lube oil contamination:

wear, pitting, emulsification, oxidation, lacquering. Lubrication while running-in a new engine or after maintenance or replacement of lubricating components. Maintenance of lubricating oil: abrasive particles, oxidation, water. Diagnostics of the lubricating oil system (oil analysis).

13. Starting air system: timing diagrams, starting air valve operation, materials, safety devices, air distributor operation. Reversing of the engine: methods and components involved. Safety measures in the starting and reversing system. Pilot air system. Quality of the pilot air: air driers, filters, instruments, automatic drainage, pressure control).
14. Cooling water system: central fresh water cooling system, cooling of the cylinders, heads, exhaust valves, intercoolers, turbochargers, pistons. Cooling oil system in engine pistons: effects of excessive temperature on the coolant, diagnostics and maintenance. Cooling water maintenance: additives for fresh water treatment.
15. Safety systems: fire in the utility boiler and under-piston space: factors, symptoms, fire control. Systems for preventing explosion in the starting air system. Fire detection and safety systems.

Exercises:

1. Basic features of the crankshaft system. Stroke, speed and acceleration of the piston. Harmonious elements of the piston acceleration (display). Forces acting on the crankshaft system: compression, inertia translation, centrifugal forces.
2. Analysis of the pressure and temperature in the cylinder. Indicated and effective engine power, efficiency and breaking.
3. Analysis of the thermo-dynamic efficiency with regard to the compression ratio in various heat supply processes. Analysis of the pressure ratio psr/p1 and compression rate in various heat supply processes. Analysis of the pressure ratio psr/pmax and compression rate in various heat supply processes. Real operation process of the 2-stroke and 4-stroke engine.
4. Preparation of fuel for diesel engines. Regulation of fuel supply. Problems in using heavy fuel oils. Combustion. Effects of various injection technologies. Law of combustion. Effect of the temperature of the process.
5. Operation features of the engine. Power, mean pressure, specific fuel consumption. Variable injection timing (VIT) system, factors affecting the engine power. Environmental impact. Load characteristics. Speed characteristics. Propeller characteristics. Fouled hull and heavy propeller.
6. Recording and analysis of the indication diagram of the engine's operation processes. Analysis of the change in pressure and temperature in the cylinder. Indicated and effective engine power, efficiency and breaking. Assessment of the engine's effective power without an indicator diagram, VTS index, speed of the turbocharger.
7. Emissions of the ICE. Reduction of harmful NOx mission. Emulsification. Selective catalytic reduction (SCR).
8. Measurement and analysis of the clearance in the main and crankpin bearings.
9. Measurement and analysis of the crankshaft deflection.
10. Measurement and adjustment of clearance of the inlet and exhaust valves.
11. Measurement and adjustment of the fuel injection timing.
12. Measurement and analysis of the piston ring wear. Malfunctions and damages to the piston rings. Inspection, diagnostics, factors affecting the interval frequency of inspections and maintenance. Cylinder liners.
13. Cooling water system: central fresh water cooling system, cooling of the cylinders, heads, exhaust valves, intercoolers, turbochargers, pistons. Cooling oil system in engine pistons: effects of excessive temperature on the coolant, diagnostics and maintenance. Cooling water maintenance: additives for fresh water treatment.
14. Reversing and starting systems. Safety systems.
15. Engine control in the event of turbocharger breakdown, in shallow water operation, in case of failure of one of the cylinders. Emergency control –

<table>
<tr><td></td><td colspan="6">manual override to local control.</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
☒ Simulator practice</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

A full-time student is required to attend 95% of lectures and 100% exercises in order to take the exam and earn ECTS credits. Insufficient attendance has to be compensated by performing additional assignments (seminar papers). Students who have missed classes due to illness must have a valid medical document proving their health issues. Students who have achieved less than 50% of class attendance cannot take the exam and have to re-register the course in the following academic year.
Students can pass the exam by taking three midterm exams during the semester. Students are obliged to take all midterms. In the examination period, they can re-take only one midterm exam that they missed or failed. Students who have met attendance requirements but have failed or missed two or three midterm tests have to register for the final exam in the examination period. Students who have passed all the midterm exams are expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade. Students can 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. Attendance in exercises has to be 100%. Insufficient attendance has to be compensated by performing additional assignments (seminar papers).
Students who have missed classes due to illness must have a valid medical document proving their health issues. Part-time students who have achieved less than 20% of class attendance cannot take the exam and have to re-register the course in the following academic year.

The same grading and evaluation criteria 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>2.25</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>Exercises</td><td>0.75</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>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>
<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' activity in class is assessed over the semester. During the semester, students are continuously assessed through three written midterm tests. The first midterm test comprises Lectures 1-5 and is held in the 5th week of the semester. The second comprises Lectures 6-10 and is held in the 9th week, while the third midterm test comprises Lectures 11-15 and takes place in the 15th week of the semester. Sample tests are available on the faculty’s web-site. 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. If a student has missed / failed one of the midterm tests, he/she can re-take that test, but if a</td></tr>
</table>

student has missed or failed two or three midterm tests, he/she has to take the complete **final exam**. The final written/oral exam is not obligatory for the students who have passed all the midterm tests. A **partial final exam** is available to the students who have failed / missed one midterm test – the partial exam covers the area that the students have not mastered.
Students who have completed attendance requirements and other obligations but have failed or missed two or three midterm tests have to register for the final exam in the **examination period**. Students who have passed all the midterm exams are 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.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	95	32.142
Exercises	100	10.714
Midterm test I	50	19.047
Midterm test II	50	19.047
Midterm test III	50	19.047

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)

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
D. Woodyard: *Pounder's Marine diesel engines and gas turbines*, Elsevier, 2004.		Yes
Ž. Parat: *Brodski motori s unutarnjim izgaranjem*, University of Zagreb, 2005.	4	Yes
K. Kuiken: *Diesel Engines for ship propulsion 1 & 2*, Zwolle, Netherland, 2012.	2	
Learning materials of the course teacher.	3	Yes

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

1. Mikuličić: *Motori I*, Školska knjiga, Zagreb, 1976.
2. J. Šretner: *Brodski motori s unutarnjim izgaranjem*, University of Zagreb, 1970.

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="6">SHIP POWER SYSTEMS I</td></tr>
<tr><td>Code</td><td>PFE209</td><td>Year of study</td><td colspan="5">2</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
Nediljko Kaštelan
Marko Zubčić, 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="5">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarise with the principle of operation of electric machines and learn the fundamentals of electric power distribution throughout the vessel. Recognise the marks (graphic symbols) in electric layouts (block diagrams, triple- and single-pole electric plans…), and assess the risk due to incorrect performance of individual elements. Learn how to diagnose the driving conditions of electrical machines, observe the electric layouts of performance. Analyse and simulate the operation of a synchronous generator / motor, induction motor (using the simulator/model) and analyse simple tasks related to the operation of synchronous and asynchronous / induction machines. Set priorities in the operation of the onboard electric power system. The course provides part of the knowledge required for the chief engineer position and some knowledge from the area of electric machines / engines, devices and networks (in line with STCW).</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course “Marine electrical engineering”, previously attended.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">On successful completion of the course the student will be able to
1. explain and interpret basic requirements for the onboard electric power systems, electric machines/motors and devices,
2. make comments on basic terminology, values and principles from the area of electric machines – synchronous and induction machines (knowledge),
3. categorise the ways of electric machine operations by means of basic principles of magnetism and electro-technical phenomena in the implementation of the electric machinery (understanding),
4. carry out measurements in electric machines and experiments related to the performance of certain electric machines and states within the electric network (application),
5. create an overall measurement display of all measurements in the given machine / system, select electric machine / elements (analysis),
6. propose an electric machine that will meet specific requirements (synthesis)
7. solve problems using an engineering approach and the acquired knowledge from the areas of physics, mathematics, essential electrotechnics, fundamentals of electric machines, information science (evaluation);
8. compare the performance of different types of electric machines, analyse simple tasks related to the performance of electric machines, and simulate their performance with the aid of an appropriate simulator (in line with STCW requirements).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Introduction: mode of classwork, learning outcomes, grading, taking exams. Graphic symbols. Distribution of onboard electric networks. Influence of onboard conditions on electric machines and devices.
2. Fundamentals of onboard electric machines and plants. Influence of onboard conditions on electric machines and devices.</td></tr>
</table>

	3. Regulations governing electric machines and devices onboard ships and boats. General principles of electric machine operation. 4. Electric triple-phase transformers: basic operation principle, symmetrical and asymmetrical load, idle running and short circuit, operation in parallel, star and delta connections. Common sets of elements. 5. Synchronous machines: definition and principle of operation. Synchronous alternator – operation principle, design features and differences between cylindrical and salient pole designs. 6. Synchronous machines: exciter electrical circuit in the synchronous generator (SG), regulation of excitation in the SG circuit, parallel operation of SG and synchronisation. 7. Synchronous machines: fault diagnostics in SG (el. values) and cure; analysis of power factors in SG. 8. Synchronous machines: principle of operation of synchronous machines – basic features. Load characteristics in synchronous machines, analysis of power factors by using synchronous motors. 9. Asynchronous / induction machines: essential operation principles and designs. Difference between cage-type and wound-type induction motors. 10. Asynchronous / induction machines: momentum characteristic, sliding, AM load. Start-up of induction motors, speed regulation. 11. Asynchronous / induction machines: speed regulation, protection and maintenance of induction motors. 12. Effect of frequency and change in alternating current on the speed and temperature. 13. Effect of the change in speed and voltage of the AC motor on the momentum, power and motor operation. 14. Motor speed regulation by the insulated-gate bipolar transistor (IGBT) electrode. 15. Motor speed regulation by thyristors. **Exercises:** 1. Explanation of the electric circuit symbols. 2. Electrical triple-phase transformers – winding sets and set groups. 3. Using a Megger and a multimeter. Measures of precaution taken during the measurements. 4. Using a Megger and a multimeter. Measures of precaution taken during the measurements. 5. Synchronous generator – exciter field regulation (simulator). 6. Synchronous generator – automatic voltage regulator (simulator). 7. Synchronous generator – load distribution (simulator). 8. Synchronous machine – parameters of a synchronous machine (auditory exercise). 9. Protection of generators: instruments and control devices on the switchboard (simulator). 10. Maintenance of the generator (simulator). 11. Prime mover – control and regulation (simulator). 12. Induction motors – momentum characteristics (auditory exercise). 13. Starting the induction motors (simulator). 14. Motor speed regulation by transistors and thyristors. 15. Essential protection in the electric circuit – maintenance and servicing (video).	
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	☒ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)

<table>
<tr><td>Student responsibilities</td><td colspan="6">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. 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 (lectures and auditory exercises) and 100% of practical work (laboratory exercises). 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:

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. In case of learning modules that are in line with the STCW Convention, the responsibilities of part-time and full-time students are the same: at least 95% of class attendance (lectures and auditory exercises) and 100% of practical work (laboratory exercises). Students with insufficient attendance cannot take the exam have to re-register the course in the following academic year.
• Classes are in compliance with the STCW Convention.</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>(Other)</td><td></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</td><td>Oral exam</td><td></td><td>Auditory exercise</td><td>0.25</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 meet the requirements for earning the final grade in two ways.
WAY 1 – Continuous assessment:
During the semester, students take three written midterm tests. Two of them assess the acquired theoretical knowledge, while the third midterm test assess practical application (tasks, calculations, electrical diagrams…). A student has to achieve at least 50% of points to pass each midterm exam, i.e. to prove the acquisition of the entire learning matter, not just a part of it. If a student has missed / failed one of the midterm tests, he/she cannot take the following midterm test. The midterm test comprising practical tasks is held on a number of occasions throughout the semester. The final grade is achieved through continuous assessment, class attendance, creation and presentation of seminar papers and midterm test results.
WAY 2 – Final exam:
If a student misses or fails the continuous assessment, he/she has to take the complete final exam in the examination period. The final exam consists of written and oral part. Students who pass the written test 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.

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>95</td><td>37.5</td></tr>
<tr><td>Laboratory exercises</td><td>100</td><td>6.25</td></tr>
</table>
</td></tr>
</table>

	Auditory exercises	100	6.25
	Midterm test I	50	16.66
	Midterm test II	50	16.66
	Midterm test III	50	16.66

- Classes are in compliance with the STCW Convention.

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)

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	M. Krčum: *Brodski el. strojevi i uređaji*, University of Split – Faculty of Maritime Studies, 2005 – notes from lectures		Yes
	M. Milković: *Brodski električni uređaji i sustavi*, Faculty of Maritime Studies in Dubrovnik, 1996.	2	
	B. Grilec: *Električni strojevi i pogoni*, Faculty of Mechanical Engineering and Naval Architecture – University of Zagreb, 2005.	1	
	D. T. Hall: *Practical Marine Electrical Knowledge*, Witherby, London 1999.	2	

Optional literature (at the time of submission of study programme proposal)	1. M. Krčum: *Električni strojevi I*, University of Split – Department of Professional Studies, 2009. 2. M. Krčum: *Električni strojevi II*, University of Split – Department of Professional Studies, 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="6">MARINE ENGINE SYSTEMS</td></tr>
<tr><td>Code</td><td>PFS204</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, 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">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Acquiring basic and advanced knowledge about propulsion systems, general service systems, and special systems on board vessels at the operational and management levels. Familiarisation with the operation and monitoring of the systems from the engine control room and locally. Familiarisation with the marine engine exploitation and measures aimed at the marine environment protection.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Course “Marine auxiliary engines and machinery” registered.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">Upon attending the course and passing the exam, the students will be able to:
1. Read and create classification layouts of ship's pipelines,
2. Describe the function of the ship's pipelines and instruments for measurement within the pipelines,
3. Distinguish the layouts of the ship's pipelines,
4. Recognise the essential pipelines and alarms for the safety of propulsion,
5. Analyse the interdependence of the measured values and the cause-effect relationships of the values that are indicated by alarms,
6. Prepare the working area for maintaining the marine engine or equipment to ensure the safety of staff at work,
7. Promptly respond to the detected malfunctions of the engine systems and take adequate measures,
8. Plan the maintenance of ship's pipelines in order to enable the maximum seaworthiness of the vessel,
9. Perform the duties of the engine officer at the operational and management levels in a safe way.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures and exercises:

1. Introduction; marine propulsion plants, categorisation of the vessel's engine systems.
2. Pipelines; fundamentals of the properties of fluids, flow losses, calculation of the pipe's diameter, dilatations, materials. Coupled pipes. Valves, check / stop / non-return / safety / alarm valves. Insulation of the pipelines.
3. Cooling system; chemical properties of water, sea suction collector, types of cooling systems (direct and indirect cooling. Designs of indirect cooling (conventional system, cooling of the liners / main engine / main engine pistons / fuel injectors / lubricating oil). Sampling and testing of the cooling water and interpreting the results. Fundamentals of corrosion and the protection of the pipelines and ship’s hull.
4. Centralised cooling system (system of low-temperature / high-temperature fresh water, sea water system), analysis of flow in the fresh water system. Sampling and testing of the cooling fresh water and interpreting the results.
5. System of oils; lubrication oil for the marine engine plant, systems of lubricating marine diesel engines (circulation of lubricant in the main diesel engine, system of lubricating the main engine cylinders, circulation of lubricant in the auxiliary diesel engines, lubrication of stern-tube bearings, lubrication of</td></tr>
</table>

	other onboard machinery). Separation of lubricants, exploitation and maintenance of the lubrication system components; hydraulic systems and their characteristics and elements, hydraulic layouts of the open and closed systems. Sampling and testing of the lube oil and interpreting the results. 6. Fuel system: general information on fuels and their properties. Physical properties of fuel, fuel treatment (additives, homogenisators). Fuel analysis according to ISO 8217:2017. Systems of bunkering and transfer of fuel, sampling and testing of the fuel, in compliance with the Resolution MEPC.324(75), and interpreting the results. Fuel impurities. Fuel tanks (fuel storage tanks, settling tanks, service tanks, mixing tank). Fuel purification system, homogenisator in fuel purification system; fuel supply control system, viscosity control system, fuel system of auxiliary engines, emergency generator and oil-fired boiler. 7. System of compressed air; compressor, compressed air registers / pipelines / armature / consumers. Air starting system. 8. Feed water system: generating fresh water on board vessels, boiler feed water, feed water systems (open and closed systems). 9. Ballast water system: ballasting of tankers, system for automatic trimming, ballasting and deballasting conditions. Plan of managing ballast waters (design, construction and mode of operation of the facilities for ballast water treatment). 10. Bilge: description of the bilge system, pipelines and armature, collecting and discharging bilge waters from / in various areas, ejector self-suction device, bilge separator. 11. Sanitary systems: requirements for quality of the water onboard vessels, system of fresh water generation, fresh water storage tanks, distribution of sanitary water, disinfection procedures, hydrophore, fresh water heaters. 12. System of black and grey water treatment. 13. System for waste burning, incinerator. 14. Vents, overflow piping, sounding piping. 15. Systems in crude oil and chemical tankers: inert gas system, inerting the liquified gas holds, exhaust gas purification systems, crude oil washing of the tanks, drying tank system, cargo heating system. Chemical tankers; inert gas systems, nitrogen as inert gas. Liquefied gas carriers: properties of gases and processes of liquefaction and maintaining constant pressure in tanks; handling the cargo when loading / unloading.	
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work	☒ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	**Obligations of full-time students:** A full-time student is required to attend 95% of lectures and 100% exercises in order to take the exam and earn ECTS credits. Insufficient attendance has to be compensated by performing additional assignments (seminar papers). Students who have missed classes due to illness must have a valid medical document proving their health issues. Students who have achieved less than 50% of class attendance cannot take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking **two midterm exams** during the semester. Students are obliged to take all midterms. In the examination period, they can re-take only one midterm exam that they missed or failed. Students who have failed or missed both midterm tests have to register for the final exam in the examination period. Students who have passed both midterm exams are 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. Attendance in exercises has to be 100%. Insufficient attendance has to be compensated by performing additional assignments (seminar papers).
Students who have missed classes due to illness must have a valid medical document proving their health issues. Part-time students who have achieved less than 20% of class attendance cannot take the exam and have to re-register the course in the following academic year.

Students shall not receive the certificate of fulfilment of the conditions for obtaining the Certificate of Additional Competence (according to the regulations of Croatia's Ministry of the Sea, Transport and Infrastructure) if they were not present for more than 5% of the total duration of the training program and if they did not attend the practical part of the training in full.

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		Field work	0.5
Essay		Seminar essay		(Other)	
Midterm tests	3.375	Oral exam		(Other)	
Written exam		Project		(Other)	

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

Two written midterm tests, assessing the students' acquisition of theoretical knowledge, are administered upon completing the lectures and exercises dealing with the respective learning matter. 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. His/her grade is entered into the student's online service ("Studomat") in the examination period. A **partial final exam** is available to the students who have failed or missed one midterm test. The partial exam, evaluating students' practical skills and theoretical knowledge, covers the area that the students have not mastered. The exam can be taken only by the students who have met attendance requirements (lectures, exercise and field work).

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	28.13
Field work	100	12.50
Midterm test I	50	29.685
Midterm test II	50	29.685

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)

<table>
<tr><td></td><td>
<table>
<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>

Continuous assessment and grading of part-time students:
Part-time students are required to attend at least 50% of the lectures and 100% of the exercise. The same criteria are applied for assessing the performance and grading of part-time and full-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>D. Martinović: Brodski strojni sustavi, Faculty of Maritime Studies in Rijeka, 2005.</td><td></td><td></td></tr>
<tr><td>M. Matković: Protupožarna zaštita na brodovima, Faculty of Maritime Studies in Rijeka, 1996.</td><td></td><td></td></tr>
<tr><td>D. Martinović: Brodski rashladni uređaji, Školska knjiga, Zagreb, 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. D. Martinović, P. Stanković: Sustav inertnog plina, Faculty of Maritime Studies in Rijeka, 1995.
2. D. Martinović, P. Stanković: Sigurnost na tankerima, Faculty of Maritime Studies in Rijeka, 1995.
3. D. Martinović, P. Stanković: Pranje tankova sirovom naftom, Faculty of Maritime Studies in Rijeka, 1996.</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><th colspan="2">NAME OF THE COURSE</th><th colspan="6">ELEMENTS OF MARITIME TRANSPORT</th></tr>
<tr><td>Code</td><td>PFS121</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">/</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">/</td></tr>
<tr><th colspan="8">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="7">The goal of the course is to familiarise students with the international regulations on the stability of damaged and undamaged vessels, and with the vessel’s static and dynamic stability.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="7">Course “Ship structural design”, registered.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="7">1. Categorise the vessel's stability according to various criteria.
2. Calculate the vessel's initial transverse stability and to familiarise with the elements of transverse stability.
3. Analyse the effects of various mass shifts on the elements of the vessel's transverse stability.
4. Analyse the influence of loading / discharging of masses on the elements of the vessel's transverse stability.
5. Determine the effect of free spaces and understanding their influence on the elements of transverse stability.
6. Assess the longitudinal stability of the vessel and familiarise with the elements of the longitudinal stability.
7. Analyse the influence of loading / discharging masses on the elements of the vessel's longitudinal stability.
8. Assess the dynamic stability of the vessel and the stability of a damaged vessel.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Lectures:

1. Design and technological features of various types of vessels: ro-ro ships, passenger vessels, tugs, LASH ships, cool freight carriers, other vessels. International regulations on the features of ship designs and ship systems.
2. Introduction to the stability of the vessel. Categorisation of the vessel's stability according to various criteria. Basic features, requirements of seaworthiness.
3. Initial transverse stability of the vessel: basic features, elements and indicators. Characteristic cases of the initial transverse stability.
4. Initial transverse stability of the vessel. Influence on the initial transverse stability of the vessel due to vertical shift of masses, horizontal side-way shift of masses, combined shift of masses onboard a vessel.
5. Vessel's initial transverse stability. Influence on the initial transverse stability of the vessel due to loading or discharging of masses by jumbo derricks.
6. Influence on the initial transverse stability of the vessel, free surface effect, transverse stability at higher heeling angles, stability indicator at higher heeling angles, creation of the lever curve of the static stability and the analysis of characteristics.
7. Calculation of the vessel's initial transverse stability, calculation of centration.
8. Vessel's longitudinal stability. Basic features, elements and indicators.
9. Vessel's longitudinal stability. Influence on the initial longitudinal stability of the vessel due to shift of masses and due to loading or discharging masses.
10. Vessel's longitudinal stability. Calculation of the vessel's longitudinal stability,</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">calculation of centration.
11. Dynamic stability of the vessel, effects of the vessel's dimensions and marine technologies on her stability.
12. Stability of a damaged vessel and special examples of vessel's stability. Effects of flooding on the trim and stability. Special cases of the ship’s stability.
13. Book of stability and trim. Analysis of various vessels, capacity plan, diagram list, deadweight tables, cross curves of stability. Daymard's method.
14. Ship stability calculation with the aid of computer. Ways of using computers in stability calculation. Analysis of restrictions.
15. International regulations on ship stability: their analysis and implementation.

Exercises:

1. Layouts of ships and ship lines, diagrams. General arrangement of a vessel. Introduction to tables and diagrams.
2. Ship stability documents. Tables containing elements of line drawing: hydrostatic curves, buoyancy curves, curves of form.
3. Using tables with hydrostatic data and diagram of curves. Diagram paper.
4. Transverse stability of the vessel. Calculation of the initial transverse stability of the vessel, vertical shift of masses, horizontal side-way shift of masses, combined shift of masses, loading or discharging of masses by jumbo derricks. Examples of calculation.
5. Transverse stability of the vessel. Calculation of changes in stability when loading or discharging cargo, and when using jumbo derricks.
6. Calculation of changes in stability when loading or discharging cargo, and when using jumbo derricks. Examples of calculation.
7. Calculation of free surface effects. Examples of calculation.
8. Transverse stability at higher heeling angles, stability indicator at higher heeling angles, creation of the lever curve.
9. Transverse stability at higher heeling angles, stability indicator at higher heeling angles, creation of the lever curve.
10. Vessel's longitudinal stability. Calculation of the essential elements of the vessel’s longitudinal stability, the influence on the initial longitudinal stability of the vessel due to shift of masses. Examples of calculation.
11. Vessel's longitudinal stability. Influence on the initial longitudinal stability of the vessel due to loading or discharging of masses. Examples of calculation.
12. Effects of cargo loading or discharging on the longitudinal stability of the vessel. Examples of calculation.
13. Effects of cargo loading or discharging on the longitudinal stability of the vessel. Examples of calculation.
14. Stability of a damaged vessel and special examples of vessel's stability. Effects of flooding on the trim and stability. Special cases of the ship’s stability: docking, stranding.
15. Ship stability and stresses of the ship construction. Examples of using computers for calculating the stability and stresses of a vessel’s construction. Demonstration examples.</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 100% in exercises in order to take the exam and earn ECTS credits. Insufficient attendance (excused absence up to 20%) has to be compensated by</td></tr>
</table>

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 take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. If a student fails both midterm exams, he/she has to take the complete final exam (written and oral).

Obligations of part-time students:

Their overall obligations cannot be less than 50% with regard to full-time students. The same criteria 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		(Other)		
Essay		Seminar essay		(Other)		
Midterm tests	2.875	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:

The written test can be taken as a complete test in the examination period or as two midterms. There are 2 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 6-8 and is held in the 14th week of the semester. Sample tests are available online and at the end of each lecture class. A student has to achieve at least 50% of points to pass a midterm exam. Students who fail or miss one midterm test for justified reasons, can re-take the test. The final grade comprises the class attendance, results of the midterm tests, seminar paper, final written exam and oral exam. In case of a student has met the attendance requirements 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.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	28.125
1st midterm test	50	35.937
2nd midterm test	50	35.937

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)

<table>
<tr><td></td><td colspan="3">Full-time students with less than 80% of attendance in classes (combined lectures + exercises) and part-time students with less than 50% of attendance in classes cannot register for the exam. The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="8">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>J. Dvornik, S. Dvornik: Stabilnost broda [Ship’s stability], Faculty of Maritime Studies in Split, 2021.</td><td></td><td></td></tr>
<tr><td>P. Komadina: Brodovi multimodalne prijevozne tehnologije, Faculty of Maritime Studies in Rijeka, 1998.</td><td></td><td></td></tr>
<tr><td>P. Komadina: Tankeri, Faculty of Maritime Studies in Rijeka, 1994.</td><td></td><td></td></tr>
<tr><td>P. Komadina: Ro-Ro brodovi, Faculty of Maritime Studies in Rijeka, 1987.</td><td></td><td></td></tr>
<tr><td>J. Uršić: Stabilnost broda 1 i 2, University of Zagreb, 1968.</td><td></td><td></td></tr>
<tr><td>M. Milošević, Š. Milošević: Osnove teorije broda 1 i 2, Zagreb, 1981.</td><td></td><td></td></tr>
<tr><td>J. Fatur: Plovnost broda.</td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="3">1. Biblioteka pomorskog časnika, sv. 1, sv. 2, sv. 3, sv. 4
2. Biblioteka Sigurnost na moru.
3. D. J. House: Cargo Work, Butterworth-Heinemann.</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">MARITIME ENGLISH IV</td></tr>
<tr><td>Code</td><td>PFP156</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Tomislav Skračić, MA, senior lecturer</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>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">10</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Familiarisation with, and the use of, frequent language structures and technical and maritime vocabulary. Development of speaking, listening, reading, understanding, writing and cross-cultural skills with special focus on developing communication skills that marine engineers require in future professional environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">✓ Course “Maritime English III” registered.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. In English language, describe the basic features of the cylinder head and valves.
2. Describe the role of inlet and exhaust valves, and describe the operating principle of the valve operating gear. Recognize various gear types.
3. Explain the procedure of reversing the main engine; explain the purpose of the gearbox and CPP propeller.
4. Describe the systems of fresh air and exhaust gas; describe the basic operation principle of the turbocharger and its advantages.
5. Analyse the importance of the safety of navigation, personal safety and engine room housekeeping. In English language, interpret and provide information about the above topics in oral and written form.</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. Cylinder head and valves.
2. Cylinder head and valves. Tightening sequence.
3. Technical terminology and grammar structures.
4. Inlet and exhaust valves. Parts, materials, stresses, cooling.
5. Inlet and exhaust valves. Damage, pitting, maintenance.
6. Technical terminology and grammar structures.
7. Valve operating gear. Camshaft, drives, push rods, rocker arm.
8. Valve operating gear. Gears – definition & types.
9. Technical terminology and grammar structures.
10. Reversing. Procedure.
11. Reversing. Couplings, clutches. Turning gear.
12. Technical terminology and grammar structures (Reversing, Gearbox, CPP / FPP).
13. Air and exhaust systems and turbochargers. Principle of operation. Essential elements.
14. Air and exhaust systems and turbochargers.
15. Review of technical terminology and grammar structures.
Exercises
1. Review of Tenses – Active Voice.
2. Review of Tenses – Active Voice. Verb "carry".
3. Review of Modal Verbs. Weather patterns and weather in the Adriatic.
4. Expressing the cause; Reason Clauses I.
5. Cause-Result relationship – exercise.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">6. Technical terminology and grammar structures.
7. Means, Agent. Review.
8. MIDTERM test 1.
9. Review of Tenses – Passive Voice.
10. Collocations; Cause, Reason Clauses II.
11. Requests and reports: provision, failure and breakdown, hand-over.
12. Technical terminology and grammar structures (Reversing, Gearbox, CPP / FPP).
13. Personal Safety in the Engine Room; Verbs "do" and "make".
14. Review.
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
☒ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">All students are expected to attend lectures and exercises regularly, to be active in class, and to take midterm exams or, alternatively, the final exam. Students apply for examination through the on-line service (“Studomat”).
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 + exercises) in order to take the exam and earn ECTS credits. insufficient attendance may be compensated by performing independent assignments, 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 50% of class attendance cannot take the exam and 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 (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, i.e. additional individual workload. Students whose absence has not been justified (employment, apprenticeship, illness…) cannot take 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>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>Activity in class</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>1.75</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>

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

Students can pass the exam by taking **two midterm exams** during the semester. In the examination period, they can re-take the midterm exam that they missed or failed. If a student has actively participated in class, he/she does not have to take the **oral exam**. Students shall take the oral exam in case of insufficient activity in class or if they do not agree with the final grade the teacher has suggested and would like to achieve a higher grade. The final grade comprises the class attendance, results of the midterm tests or the final exam, and the activity in class.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance	80	25
Active participation in class	50	16.66
Midterm I	50	29.17
Midterm II	50	29.17

Final assessment

Assessment tools – final exam	Performance (min. %)	Participation in the final grade (%)
Written exam	50	50
Oral exam	50	30-50
Previous activities	80	0-20

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)

The same assessment and grading criteria apply to full-time, part-time and incoming Erasmus+ students.

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

Title	Number of copies in the library	Availability via other media
Spinčić, A., *An English Textbook for Marine Engineers II*., 4th amended ed., Faculty of Maritime Studies in Rijeka, 2009.	30	yes
Skračić, T.: PowerPoint presentations available online at Merlin e-learning platform.	-	yes
Luzer, J., Spinčić, A., *Gramatička vježbenica engleskog jezika za pomorce*, 3rd edition, Faculty of Maritime Studies in Rijeka 2003.	5	yes

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

1. Spinčić, A., Luzer, J. *Engleski u brodostrojarskim komunikacijama – English in marine engineering communications*, 3rd amended ed., Adamič, Rijeka 2007.
2. Plančić, Bisera; Skračić, Tomislav: *Englesko-hrvatski pomorski rječnik / English-Croatian Maritime Dictionary*, Faculty of Maritime Studies in Split, 2017.

	3. Selected articles from web-sites, papers and journals on marine engineering and manuals for operation, maintenance and repair of marine engines and machinery.
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">CARGO HANDLING SYSTEMS</td></tr>
<tr><td>Code</td><td>PFS225</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Francisko Lukša, PhD, associate professor</td><td>Credits (ECTS)</td><td colspan="4">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>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">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Basic technical-technological features and criteria for the application of certain types of transhipment systems with special focus on exploitation characteristics of cargo handling systems with regard to the type of cargo, ways of handling and the applied transport technology.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">No.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Discuss and analyse an example of a cargo handling system with regard to the type of cargo.
2. Draw the layout of the technical and technological features of a cargo handling system and the operation system.
3. Discuss and analyse the continuous ship unloading facilities, including pneumatic and hydraulic transport.
4. Make a comparative analysis of the application of various cargo handling systems.
5. Analyse the calculation of the operational cycle and performance of transhipment systems.</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. Cargo hatch covers – general notions.
3. Hatch covers – part I.
4. Hatch covers – part II.
5. Cargo handling equipment in Ro – Ro ships – general notions.
6. Cargo handling equipment in Ro – Ro ships – part I.
7. Cargo handling equipment in Ro – Ro ships – part II.
8. Liquid cargo handling equipment – general notions.
9. Liquid cargo handling equipment – part I.
10. Liquid cargo handling equipment – part II.
11. Bulk cargo handling equipment.
12. Container transshipment facilities.
13. General cargo handling equipment.
14. LASH ship transshipment.
15. Liquefied gas transshipment facilities.</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 have to attend at least 80% lectures to take the</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">exam and earn ECTS credits. It is considered that students have fulfilled their obligations if they have met attendance requirements and have submitted all assigned program tasks (seminar papers). Students who have not fulfilled their obligations cannot take the exam and 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 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>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">There are two midterm exams in the semester. The first 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. A student has to achieve at least 50% of points to pass a midterm exam. The final grade comprises the class attendance, results of the midterm tests, and the results of the oral 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>25</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>
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>
Assessment and grading of part-time students:
Part-time students are required at least 50% of class attendance to take the exam. 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="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td></td><td colspan="3">Matić, A.: Prekrcajna sredstva u pomorskom transportu 1, Veleučilište u Dubrovniku, Dubrovnik, 2000.</td><td></td><td></td></tr>
</table>

	Mavrin, I.: *Transporteri*, Fakultet prometnih znanosti, Zagreb, 1999.		
	Dundović, Č.: *Metoda vrednovanja eksploatacijskih parametara lučkih obalnih dizalica*, Pomorski zbornik 30, Rijeka, 1992.		
	Dundović, Č.: *Teorijske osnove za proračun vremena putanje lučkih obalnih i mobilnih dizalica*, Zbornik radova Pomorskog fakulteta u Rijeci, god. 6, Rijeka, 1992.		
Optional literature (at the time of submission of study programme proposal)	1. Dević, M.: *Dizalice i dizaličar*, Zavod za zaštitu pri radu, Zagreb, 1970. 2. Dundović, Č.: *Metodologija planiranja i upravljanja lučkim prekrcajnim sredstvima*, ISEP Conference, Ljubljana, 1996. 3. Dundović, Č., Kolanović, I.: *Ocjena i tendencije razvitka prekrcajnih kapaciteta hrvatskih morskih luka*, Pomorski zbornik 39, 2002, pp. 137-152.		
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">MATHEMATICS III</th></tr>
<tr><td>Code</td><td>PFP113</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Tatjana Stanivuk, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Matko Maleš, 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>Elective</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">To acquire the knowledge and techniques from the areas indicated in the syllabus of Mathematics III, which are necessary for understanding and mastering the matter in the courses within the curriculum, and for the expected application in practice.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">The course “Mathematics I” attended and passed, the course “Mathematics II” registered.</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 calculate double and triple integrals.
2. Solve problems by applying double and triple integrals.
3. Define and interpret the meaning of the scalar and vector fields.
4. Use differential operators.
5. Define and solve the curve and surface integrals.
6. Solve practical problems with the aid of complex functions, Fourier's orders and integrals.
7. Define Laplace's transformations and apply them in solving differential equations.</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. Double integral and its application.
3. Triple integral and its application.
4. Scalar and vector field.
5. Differential operators.
6. Smooth surface curve. Surface curve integral of the first order.
7. Curve integral of the second order. Green's formula.
8. Surface integral of the first order.
9. Surface integral of the second order.
10. Gauss - Ostrogradski formula. Stoke's theorem and applications.
11. Fourier's order.
12. Fourier's transformation.
13. Laplace's transformation.
14. Solving simple differential equations by using Laplace's transformations.
15. Review.
Exercises:
1. Overview of some integrals.
2. Double integral and its application.
3. Triple integral and its application.
4. Scalar and vector field.
5. Differential operators.
6. Surface curve integral of the first order.
7. Curve integral of the second order. Green's theorem.
8. MIDTERM test 1.
9. Surface integral of the first order.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">10. Surface integral of the second order. Gauss - Ostrogradski formula. Stoke's theorem and applications.
11. Fourier's order.
12. Fourier's transformation.
13. Laplace's transformation.
14. Solving simple differential equations by using Laplace's transformations.
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
☒ 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 (two partial exams) during the semester. In case of passing both 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 take 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></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">Every student has to take the written and oral exam.
The written part of the exam consists of two partial exams (midterm tests) that are held in the 8th and the 15th week of the semester. Alternatively, a student can take the final exam that takes place in the examination period.
A student has to achieve at least 50% of points to pass a midterm exam. In case a student passes both midterm exams, he/she does not have to take the final exam. If a student has passed just one midterm exam, he/she will take the final exam covering only the area that he/she failed to pass. 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.

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

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Attendance	80	28
Midterm test No. 1	50	36
Midterm test No. 2	50	36

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)

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
Merlin e-learning platform: https://moodle.srce.hr/2021-2022/		Yes
N. Uglešić: *Viša matematika II*, Split, 2000.		Yes
I. Slapničar: *Matematika 3*, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture Split, 2006.		Yes
L. Korkut, M. Krnić, M. Pašić: *Vektorska analiza*, Element, Zagreb, 2006.		Yes
N. Elezović: *Fourierov red i integral, Laplaceova transformacija*, Element, Zagreb, 2006.	4	
Demidovič, B. P.: *Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete*, Zagreb, 1995.	15	Yes

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

1. Ušćumlić, M.; Miličić, P.: *Zbirka zadataka iz više matematike II*, Naučna knjiga, Beograd, 1989.
2. Dž. Lugić: Matema*tika II - metodički riješeni zadaci i kratki pregled definicija i teorema*, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture Split, 1999.

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 AND MARINE ENVIRONMENT PROTECTION</td></tr>
<tr><td>Code</td><td>PFN205</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Merica Slišković, PhD, full professor</td><td>Credits (ECTS)</td><td colspan="5">2</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="5">10</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Defining the potential sources of marine environment pollution from vessels. Prevention of pollution and taking appropriate measures in case of pollution detection. Acquiring the provisions of MARPOL Convention 73/78 and legal regulations.</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. Identify the types and characteristics of pollutants, and assess the effects of pollution on the marine environment and human life.
2. Categorise the most frequent sources of pollution from ships and describe measures to prevent the pollution of marine environment.
3. Interpret the basic contents of the International convention for the prevention of pollution from ships (MARPOL) 73/78 and its amendments (Annexes to MARPOL I - VI), and the most important international regulations on the prevention of pollution from ships (referring to machinery spaces, cargo holds and ballast tanks).
4. Associate the anti-pollution procedures with the required equipment.
5. Discuss the purpose of regional cooperation aimed at pollution prevention, commitment and adequate responses to pollution incidents – Subregional plan.
6. Interpret the Plan of interventions (SOPEP) and provide a brief description of basic elements to be incorporated in SOPEP (Article 26 of Annex I to MARPOL).</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. Pollution of the sea.
2. Pollution of the sea as a result of human activities.
3. Vessel as a source of pollution of the marine environment. Harmful influence of vessels on the marine environment.
4. Prevention of sea pollution from ships - MARPOL Convention 73/78.
5. Annex I – prevention of sea pollution from ships by oils.
6. SOPEP – Onboard plan in the event of sea pollution: obligatory and non-obligatory requirements.
7. Annex II - prevention of sea pollution from ships by harmful liquids.
8. Annex III - prevention of sea pollution from ships by harmful substances in packaged form.
9. Annex IV - prevention of sea pollution from ships by sewage waters.
10. Annex V - prevention of sea pollution from ships by discarding waste.
11. Annex VI - prevention of air pollution from ships.
12. Prevention of the sea pollution by ballast waters from ships.
13. International convention on monitoring and managing ship's ballast waters and sediments.
14. Intervention plan in the event of sudden pollution of the sea in the Republic of Croatia.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">15. Legal regulations governing the protection of marine environment. International regulations. Regulations of the Republic of Croatia on the protection of the sea and marine environment.</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. Students have to attend at least 80% of lectures. Students with insufficient attendance cannot take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. Students who have missed or failed the midterm exams, shall take the complete final exam. Students are assigned topics and issues to be explored through individual or team work, using the e-learning material. The student who has passed 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 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 grading and evaluation criteria 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>e-learning</td><td>0.25</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>1</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. The first comprises Lectures 1-6 while the second midterm test comprises Lectures 7-13. Sample tests are available online and upon completing each lecture class. 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 1st midterm test. The students who do not pass the first midterm test cannot take the second midterm test. 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, results of the midterm tests and individual/team assignments. In case of a student has fulfilled the course obligations 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.
Continuous assessment:
<table><tr><td>Elements of assessment</td><td>Performance (min.%)</td><td>Participation in the final grade (%)</td></tr></table></td></tr>
</table>

Class attendance	80	7.5
e-learning	50	2.5
1st midterm test	50	45
2nd midterm test	50	45

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.

Required literature (available in the library and via other media)	**Title**	**Number of copies in the library**	**Availability via other media**
	International convention MARPOL, 1973/78.	5	Yes
	SOLAS Convention, 1974 (Chapter VII)	3	Yes

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

1. Bićanić, Z.: *Zaštita mora i morskog okoliša*, Split, 2003.
2. Laws, E. A.: *Aquatic Pollution*, University of Hawaii, Hawaii, 1993.
3. Burger, J.: *Oil spills*, Rutgers University Press, USA, 1997.
4. Fingas, M.: *Basis of oil spill cleanup*, Lewis Publisher, Florida USA, 2001.
5. *International Oil Pollution Compensation Funds*, Claims Manual, IMO, 1996.
6. Đikić, D.: *Ekološki leksikon*, BARBAT, Zagreb, 2001.
7. *Ballast Water Management Manual*, Fairmont Shipping Ltd., Canada, 2005.
8. Punda, V. and D. Rudolf: *Pravo mora*, Pravni fakultet, Split, 2007.
9. *Zaštita okoliša u pravnom sustavu RH*, set of regulations.

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 colspan="2">NAME OF THE COURSE</td><td colspan="6">AUTOMATION OF MARINE ENGINE SYSTEMS I</td></tr>
<tr><td>Code</td><td>PFE103</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Petar Matić, PhD, Associate Professor</td><td>Credits (ECTS)</td><td colspan="5">5</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>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">Acquisition of knowledge necessary for understanding the operation principle of the systems for automatic running of ship's engines and machinery. Familiarisation with the operation principle of the sensors, controllers, actuators and the principles of setting the automation systems. Acquisition of appropriate knowledge in line with STCW and IMO Model Courses 7.02 for the chief engineer service.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Courses “Mathematics I” and “Marine electrical engineering” previously attended and passed.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Identify the basic components of automatic regulation loops.
2. Present the basic principles of the operation of sensors and actuators in the marine engine plant.
3. Draw an open automation system, system with disturbance compensation and system with closed-loop regulation.
4. Compare the process management systems of the first, second and higher orders.
5. Distinguish the characteristics of P, PI and PID controllers.
6. Identify the parameters affecting the stability of automation systems.
7. Explain the ways of setting the sensors and gauges.
8. Distinguish basic techniques of the controller setting.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Fundamentals of process regulation and control. Examples and basic features of the automation systems on board and ashore. Principles of automatic regulation and control. SISO, SIMO, MISO and MIMO systems. Principle of the open control system.
2. Principle of the feedback. Examples of the stabilisation system and servo system. Response of the closed-loop regulation system during changes in the disturbance and reference values. Compensation principle.
3. Modelling of the automation system. Laplace's transformation. Inverse Laplace's transformation with examples. Transient weighting and transfer function of the system. Convolution integral.
4. Distribution of the system. Proportional element of the zero, first and second order. Mathematical description. Examples. Integration element of the zero, first and second order. Derivation element of the zero, first and second order. Dead time element. Mathematical description. Examples. Block algebra. Case solving. Definition of the controller. On/Off controller.
5. Block diagram of the controller. Comparator, amplifier, time element. Hydraulic, pneumatic and electric design. P-controller. Proportional amplification. Examples of the mechanical and electric P-controller. Response of the P-controller to the step excitation. Response of a closed-loop system featuring a P-controller to the step excitation.
6. I-controller, D-controller. PI, PD and PID controllers. Integration and derivation amplification and integration and derivation time. Response of the step excitation controller. Response of a closed-loop system. Examples.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">7. Stability of the closed-loop automation system. Methods of determining the stability (Bode plot, Niquit method).
8. Tuning of the controller (Ziegler-Nichelson, Cohen-Coon). Cascade regulation – examples on board ships. Discrete-time control systems. Discrete-event control systems.
9. Basic structures of digital control systems. Digital controllers. Programmable logic controllers. Sensors and converters. Input, output and transfer characteristics of sensors.
10. Sensors of temperature (resistors, thermocouples). Pressure gauges. Inductive, capacity and piezo-electric converters. Sensors of force and momentum. Gauges of movement and position. Speed sensing devices. Level and flow gauges. Batteries. Electric actuators – DC and AC motor, step motor.
11. Block diagram of the pneumatic system. Electro-pneumatic and pneumatic-electric converters. Example of computer-aided pneumatic system control.
12. Block diagram of the hydraulic system. Electro-hydraulic and hydraulic-electric converters. Example of computer-aided hydraulic system control.
13. Centralised, distributed and integrated automation. Example of an integrated automation of the steam generating plant and engine cooling and lubricating systems.
14. Ship automation systems of fuel supply, air-conditioning, electric power.
15. Ship automation systems – auto-pilot. Hierarchical distributed system of automatic control. Industrial computer network.

Exercises:

1. Defining a mathematical model for simple mechanical translation systems.
2. Defining a mathematical model for simple mechanical rotation systems.
3. Defining a mathematical model for simple electric systems.
4. Defining a mathematical model for simple electro-mechanical systems.
5. Designing a simulation model for the electro-mechanical system by using Matlab software.
6. Rules of block diagram algebra.
7. Defining the transfer function of the open and closed system of automatic control.
8. Defining a mathematical model for a complex system by using the rules of block diagram algebra.
9. Designing a simulation model for a complex system defined by the block diagram and transfer function.
10. Time response of the automatic control system – analysis of the transition and steady state.
11. Identification of the system through the system's time response.
12. Frequency response of the system – analysis of stability.
13. Frequency response of the system – analysis of stability with the aid of Matlab.
14. Designing and tuning of the controller by manual adjusting of the model simulated in Matlab.
15. Designing and tuning of the controller by Ziegler-Nichols method of the open and closed loop.</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">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 auditory and laboratory exercises) in order to take the exam and earn ECTS credits. Over the semester, students are given individual home tasks /</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">assignments that have to be correctly completed and submitted on time – this confirms their active participation in class. It is considered that students have fulfilled their class obligations if they have met attendance requirements and have submitted all assigned home tasks. A home task is considered submitted if it is positively reviewed by the teacher. Students who have not fulfilled their obligations cannot take the exam and 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 order to take the exam and earn ECTS credits. Other obligations correspond to the full-time students' obligations.</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>(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>3.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></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:

Two midterm tests are held during the semester. The first midterm test comprises Lectures 1-7 and the corresponding auditory exercises, and is held in the 7th week of the semester. The second comprises Lectures 8-15 and the corresponding auditory exercises, and is held in the 15th week. Sample tests are available online at Merlin e-learning platform. A student has to achieve at least 50% of points to pass a midterm exam. If a student has missed / failed one of the midterm tests, he/she can re-take that test. The final grade is defined on the basis of student attendance and midterm test results. Students who have fulfilled their obligations but have failed or missed the midterm tests have to register for the final written exam in the examination period. 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>30</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>35</td></tr>
<tr><td>2nd midterm test</td><td>50</td><td>35</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 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>Antonić, R.: Automatizacija broda II, Faculty of Maritime Studies in Split, 2007, 2nd ed.</td><td>10</td><td></td></tr>
<tr><td>Vukić, Z., Kuljača, Lj.: Automatsko upravljanje - analiza linearnih sustava, Kigen d.o.o, Zagreb, 2004.</td><td>5</td><td></td></tr>
<tr><td>Antonić, R.: Brodostrojarski simulator PPS2000 – upute za korištenje, Faculty of Maritime Studies in Split, 2001.</td><td>10</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. L. Jackson, T. Reed: Instrumentation and control systems; ISBN: 0947637869, 2002.
2. R. G. Smith: Application of automatic machinery and alarm equipment in ships, Institute of marine engineers; ISBN: 0900976152.
3. D. A. Taylor: Marine control practice, Butterworth-Heinemann; ISBN: 978-0408013130.</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">SHIP POWER SYSTEMS II</td></tr>
<tr><td>Code</td><td>PFE208</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Ivan Pavić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Luka Čulić
Marko Zubčić, 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>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">It is necessary to entirely familiarise with the high voltage electric power distribution throughout the vessel. Recognise and use all symbols and marks necessary to read layouts of electric circuits. Observe and test electric circuits. Test electric network and adjust/adopt the sequence of actions to ensure the safety of the crew members, passengers and equipment. Set priorities in the operation of the onboard el. power system. The course provides part of the knowledge required for the chief engineer position and some knowledge from the area of electric machines / engines, devices and networks (in line with STCW).</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended courses in “Mathematics I”, “Mathematics II” and “Marine electrical engineering”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">On successful completion of the course the student will be able to
1. Determine the requirements for the onboard electric power systems with regard to safety.
2. Analyse notions, values and principles in the area of onboard high and low voltage technologies (power generation and consumption).
3. Classify the ways of electric power protection and management on both low and high voltage systems.
4. Draw basic layouts of operation within the electric circuit.
5. Perform measurements at certain components of the electric power plant – high voltage. Experiments and ways of operation of individual components within the electric network (application).
6. Propose safety measures that will fulfil certain requirements (synthesis)
7. Solve problems by selecting an engineering approach and the acquired knowledge from the areas of physics, mathematics, essential electro-technical engineering, fundamentals of electric machines, information science, electric power systems (evaluating).
8. Compare the effects of different types of electric protection and simulate the performance of the existing systems with the aid of an appropriate simulator / laboratory tools (in line with STCW requirements).</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. Ways of performing classes, learning outcomes, grading, taking exams. Influence of onboard conditions on electric machines and devices.
2. Distribution of electric energy with regard to voltage, shore-based and on-board power networks.
3. Distribution of onboard electric energy: main onboard plant, short-circuit protection, coordination of protection.
4. Distribution of onboard electric – on tankers, in special safety areas. Safety system.
5. Application of high voltage technologies on board – high-voltage generators and power distribution. Functional, operation and requirements of the ship's high-voltage system with regard to safety.</td></tr>
</table>

	6. Electric propulsion – synchro-converters and cyclo-converters. 7. Advantages and shortcomings of introducing high-voltage technologies on board vessels. 8. Ways of authorising the maintenance of repair and preventive actions in the marine high-voltage system. 9. Types of earthing. Advantages and shortcomings of the earthed and unearthed systems. 10. High-voltage switches. 11. High-voltage fuses. 12. High-voltage cables. 13. Selection of proper equipment and testing. 14. Electric safety – testing equipment and protocol. 15. Sources of energy in emergencies. Description of symbols in the electric circuit. **Exercises:** 1. Measuring the isolation in individual parts of the electric circuit. 2. Starting a synchronous generator in case of emergency. 3. Description of symbols in the electric circuit – control diagrams. 4. Electric circuit protection. 5. Fault repair procedures – detecting faults – video examples. 6. Fault repair procedures – fault analysis – video examples. 7. Fault repair procedures – list of potential inadequate / wrong actions. 8. Fault repair procedures – detecting malfunctions – electric circuit. 9. High-voltage simulator – on/off switch. 10. High-voltage simulator – on/off disconnector. 11. High-voltage simulator – fuses. 12. High-voltage simulator – video examples of protection measures. 13. High-voltage simulator – video examples of the electric arc. 14. Reading the electric diagrams – electric power supply. 15. Reading the electric diagrams – control circuit.
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☒ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	**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. 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 (lectures and auditory exercises) and 100% of practical work (laboratory exercises). 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:** 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. In case of learning modules that are in line with the STCW Convention, the responsibilities of part-time and full-time students are the same: at least 95% of class attendance (lectures and auditory exercises) and 100% of practical work (laboratory exercises). Students with insufficient

<table>
<tr><td></td><td colspan="6">attendance cannot take 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 colspan="6">
<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></td><td>Laboratory exercises</td><td>0.5</td></tr>
<tr><td>Midterm tests</td><td>2.5</td><td>Oral exam</td><td></td><td>Auditory exercises</td><td>0.5</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 colspan="6">
Students can meet the requirements for earning the final grade in two ways.
WAY 1 – Continuous assessment:
Comprising class attendance, creation and presentation of seminar papers and midterm test results. During the semester, students take three written midterm tests for assessing the acquired theoretical knowledge and practical application (tasks, calculations, electrical diagrams…). A student has to achieve at least 50% of points to pass each midterm exam, i.e. to prove the acquisition of the entire learning matter, not just a part of it. If a student has missed / failed one of the midterm tests, he/she cannot take the following midterm test. The midterm test comprising practical tasks is held on a number of occasions throughout the semester. The final grade is achieved through continuous assessment, class attendance, creation and presentation of seminar papers and midterm test results.
WAY 2 – Final exam:
Comprising class attendance, creation and presentation of seminar papers and final written and oral exam. If a student misses or fails the continuous assessment, he/she has to take the complete final exam in the examination period. The final exam consists of written and oral part. Students who pass the written test 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.

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>95</td><td>30</td></tr>
<tr><td>Laboratory exercises</td><td>100</td><td>10</td></tr>
<tr><td>Auditory exercises</td><td>100</td><td>10</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>16.666</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>16.666</td></tr>
<tr><td>Midterm test III</td><td>50</td><td>16.666</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>

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Krčum, M.: *Brodski el. strojevi i uređaji*, Faculty of Maritime Studies, 2005 – notes from lectures		Yes
	M. Milković: *Brodski električni uređaji i sustavi*, Faculty of Maritime Studies in Dubrovnik, 1996.	2	
	B. Grilec: *Električni strojevi i pogoni*, Faculty of Mechanical Engineering and Naval Architecture – University of Zagreb, 2005.	1	
Optional literature (at the time of submission of study programme proposal)	1. T. Gonen: *Electric Power Distribution System Engineering*, McGraw-Hill, New York, 1986. 2. D. T. Hall: *Practical Marine Electrical Knowledge*, Witherby, London 1999.		
Quality assurance methods that ensure the acquisition of exit competences	Student survey carried out by the University of Split, List of student attendance, Teaching process monitoring by the 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">MAINTENANCE MANAGEMENT</td></tr>
<tr><td>Code</td><td>PFS215</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Ladislav Stazić, PhD</td><td>Credits (ECTS)</td><td colspan="5">5</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 colspan="2">F</td></tr>
<tr><td>45</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">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The goal of the course is to familiarise the students with the basic causes of malfunction and failures and to enable the students to apply the acquired knowledge to the ship's systems and the vessel in general.</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">Upon successful completion of this course the student is expected to be able to:
1. Explain the maintenance costs.
2. Define and explain the basic causes of malfunction and failures.
3. Define and explain the reliability of technical systems.
4. Define and describe the maintenance strategies.
5. Describe the ways of maintaining the underwater part of the hull.
6. Define and explain the effect of spare parts on the maintenance procedure.
7. Manage the system of planned maintenance on board the vessel.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Maintenance costs: direct and indirect. Effect on the maintenance costs over the entire life-span of the equipment, effect of the participants on the maintenance costs.
2. Damage and failures: initial, accidental, time-induced failures and malfunctions. The function of the distribution of failures: failure rate, failure index.
3. Reliability of technical systems: reliability with regard to initial malfunctions and failures, accidental failures, time-induced failures. Standard reliability curve. Complex reliability, redundancy, availability and useableness.
4. Technology of maintenance: requirements, spare parts, worklists, tools and equipment for maintenance, diagnostic tools and devices.
5. Planning of maintenance according to statutory and classification guidelines (organisation of maintenance in line with the ISM code).
6. Preventive maintenance: preventive examination, cleaning and lubricating. Detecting and removing weak points. Control checks, planned repairs.
7. Corrective maintenance.
8. Maintenance according to the state of the components. Characteristic value of the technical system's state: technical diagnostics, methods of technical diagnostics.
9. Safe management and efficient procedures in maintenance and repair in accordance with the vessel's SMS.
10. Modern approaches to maintenance: RCM, logistic approach.
11. Organisation and technologies of maintenance in the shipping industry.
12. Maintenance of the underwater part of the ship's hull: dry-docking, sand blasting, priming, coating (standard, SPC...).
13. Spare parts.
14. Software supporting maintenance procedure and maintenance planning.
15. Influence of the classification societies, international maritime conventions, guidelines and the national legislation on the maintenance of vessels.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">Exercises:

1. Configurations of the ship systems and reliability – calculation examples.
2. Structural equation modelling software for the maintenance support and planning. Introduction to the software.
3. Developing a configuration of the maintenance of the ship systems.
4. Developing a configuration of the maintenance of the ship systems: adding a system, a sub-system, components.
5. Examples of the configuration of critical equipment.
6. Lists of the due maintenance items.
7. Creating working orders and assignments by maintenance items.
8. Examples of reports on the completed task.
9. Statistical analysis of the corrective maintenance share in the maintenance planning.
10. Examples of reports on the used spare parts.
11. Examples of the analysis of the spare part stock.
12. Making orders for the spare parts.
13. Examples of spare part stock updating (items used / received).
14. Service letters from the equipment manufacturers.
15. Examples of monitoring the maintenance of the ship systems and the control of ship certificates, in line with the requirements of the PMS classification societies.</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. A full-time student is required to attend 95% of lectures and 100% exercises in order to take the exam and earn ECTS credits. Insufficient attendance has to be compensated by performing additional assignments (seminar papers). Students who have missed classes due to illness must have a valid medical document proving their health issues. Students who have achieved less than 50% of class attendance cannot take the exam have to re-register the course in the following academic year.
Over the semester, students can pass the exam by taking two midterm tests covering the respective course (lectures and exercises) contents. Students are obliged to take both midterms. In the examination period, they can re-take only one midterm exam that they missed or failed. Students who have fulfilled course obligations but have failed or missed two or three midterm tests have to register for the final exam in the examination period. Students who have passed both midterms are 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. Attendance in exercises has to be 100%. Insufficient attendance has to be compensated by performing additional assignments (seminar papers).
Students who have missed lectures due to illness must have a valid medical document proving their health issues. Part-time students who have achieved less than 20% of class attendance cannot take the exam and have to re-register the course in the following academic year.</td></tr>
</table>

<table>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.5</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></td><td>(Other)</td><td></td></tr>
<tr><td>Midterm tests</td><td>3.5</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></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' activity in class is assessed over the semester. Students take two written midterm tests. The first test comprises Lectures 1-8 and is held in the 8th week of the semester, while the second comprises Lectures 8-15 and takes place in the 15th week of the semester. Sample tests are available online at Merlin e-learning platform. A student has to achieve at least 50% of points to pass a midterm test. In case a student passes both tests, he/she does not have to take the final exam. If a student has missed / failed one of the midterms for justified reasons, he/she can re-take that test in the following examination period. If a student has missed or failed both midterms, he/she has to take the complete final exam. The final written/oral exam is not obligatory for the students who have passed the midterms. A partial final exam is available to the students who have failed one of the midterms – the partial exam covering the area the students have not mastered. Students who have fulfilled course obligations but have failed or missed two or three midterm tests have to register for the final exam in the examination period. Students who have passed all the midterm exams are expected to register through the on-line service (“Studomat”) in the first examination period to obtain the grade. The final grade is defined on the basis of student attendance and midterm test results. Students shall take the final oral exam in case they would like to achieve a higher grade. 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>95</td><td>30</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>35</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>35</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>
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="3">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)	J. Lovrić: *Osnove brodske terotehnologije*, Faculty of Maritime Studies in Dubrovnik, 1989.		
	Šegulja, Bukša, Tomas: *Održavanje brodskih sustava*, Faculty of Maritime Studies in Rijeka, 2009.		
Optional literature (at the time of submission of study programme proposal)	1. Lectures of the course holder are available at Merlin e-learning platform. 2. B. Vučinić: *Maintenance Concept Adjustment of Design*. 3. N. Vujanović: *Teorija pouzdanosti tehničkih sistema*, Belgrade, 1987.		
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)			

NAME OF THE COURSE	MARITIME LAW					
Code	PFP129	Year of study	3			
Course teacher	Ranka Petrinović, PhD, full professor with tenure	Credits (ECTS)	3			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			30		0	
Status of the course	Compulsory	Percentage of application of e-learning	/			

COURSE DESCRIPTION	
Course objectives	The main goal of the course is to familiarise students with: international and national regulations on the rights and obligations of the states in marine and submarine areas, procedures for carrying out maritime administrative formalities on arrival, stay and departure of the ship from the port, the state-legal position of the ship, meeting the (international) requirements on the safety of navigation, particularly on the protection of human life at sea and protection of the marine environment, rights and obligations of the master and other crew members, and all persons involved in the maritime industry, liability of shipowners (shippers), maritime property institutes and the overview of the Croatian and international maritime property law.
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. Identify, distinguish and compare the sea zones in accordance with international law of the sea. 2. Classify types of vessels. 3. Distinguish basic concepts of maritime administrative law. 4. Analyse the organization of the vessel traffic service and inspection. 5. Differentiate rights and obligations from the labour law relations of seafarers. 6. Identify and classify charter parties. 7. Distinguish and compare the types of maritime averages. 8. Categorise of the types of marine insurance. 9. Analyse national and international regulations from the international law of the sea, maritime administrative law and maritime labour law, regulations governing charter parties, maritime averages and maritime insurance.
Course content broken down in detail by weekly class schedule (syllabus)	**Lectures:** 1. Definition, classification, meaning and sources of the maritime law. Maritime Code of the Republic of Croatia. The International Maritime Organization (IMO). The European Maritime Safety Agency (EMSA). 2. International law of the sea. The UN Convention on the Law of the Sea, 1982. 3. Responsibilities required by the SOLAS Convention. Ascertaining the vessel's seaworthiness. Liability according to International Load Lines Convention, 1966/88. 4. Ascertaining the ship's seaworthiness. Classification societies. 5. Marine environment protection, Responsibilities according to MARPOL Convention - 73/78 with amendments: I (oil), II (harmful liquid substances), III (harmful substances in packaged form), IV (sewage waters), V (waste) and VI (prevention of air pollution from ships). 6. Convention on the prevention of pollution by dumping waste and other matter (London Convention, 1972). International Convention relating to intervention on high seas in case of an accident causing oil pollution, 1969.

	Convention for the Monitoring and Management of Ship's Ballast Water and Sediments, 2004. International Convention on civil liability for oil pollution damage (1992), and Convention on the establishment of an international fund for compensation for damage caused by pollution, 1992. International Convention on civil liability for oil pollution damage, 2001. International convention on the liability and compensation for damage related to transport of dangerous and harmful substances by sea, 1996. 7. Ship's documents and books: Certificate of registry, International load lines convention (1966), International tonnage certificate, Certificate of passenger ship safety, Certificate of cargo ship equipment safety, Certificate of cargo ship construction safety, Certificate of cargo ship radio equipment safety, Certificate of fitness for the carriage of dangerous chemicals. 8. International Certificate of oil pollution prevention, International pollution prevention Certificate for the carriage of noxious liquid substances in bulk (NLS certificate); Certificate of class for hull, machinery and machine cooling system. Ship's logbook, Engine-room logbook, Medical logbook, Radio logbook, Cargo record book, Crew list, Passenger list, Fumigation certificate or Certificate of exemption from fumigation. 9. Maritime labour law; ship's crew - generally, division into departments, rights and obligations of members of the crew. Maritime labour convention MLC), 2006 (No. 186) – basic provisions. 10. Certificates and declarations complying with the MLC Convention. Financial guarantees, Repatriation of seafarers convention, 1926 (No. 23), Repatriation of seafarers convention (revised), 1987 (No. 166); Recommendation on repatriation of seafarers, 1987 (No. 174). Responsibility for personal injuries. 11. Ordinance on ranks and certification of seafarers, harmonized with the Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) – basic principles. Convention on minimum standards on merchant ships, 1976 (No. 147), Convention on the contract for seafarers, 1926 (No. 22), Convention on the minimum age for employment, 1973 (No. 138), Convention on the procurement, preparation and serving of food, 1946 (No. 68). Convention on the certification of ships' cooks, 1946 (No. 69). Convention on the certification of qualified sailors, 1946 (No. 74) Convention on wages, working hours on board and manning levels (revised), 1958 (No. 109), Convention on paid vacation for seafarers (revised), 1949 (No. 91); Convention on the compulsory medical examination of children and young persons employed on board ships, 1921 (No. 16). Collision, legal sources: International convention for the unification of certain rules regarding ship collisions, 1910. Convention on the accommodation of the crew on board ships (revised), 1949 (No. 92), Provision of medical advice to ships at sea by radio, 1958 (No. 105), Convention on the prevention of accidents with seafarers, 1970 (No. 134); Recommendation on the prevention of accidents with Seafarers in 1970 (No. 142), Convention on the medical examination of seafarers, 1946 (No. 73), Convention on seafarers' health insurance, 1936 (No. 56). 12. Rescue at sea: legal sources, the concept of salvage, types of salvage, navigation procedures. Modern salvage law: International convention on salvage, 1989. (London) Salvage Contract (LOF 1995, 2000 and 2011). 13. Limitation of liability of shipowners (shipping): Convention on limitation of liability for maritime claims, 1976 (LLMC Convention). 14. International regulations on the carriage of goods by sea, International Convention for the unification of certain rules relating to Bills of Lading, 1924 (Hague Rules) with the Protocol, 1968 (The Hague-Visbi rules). The contract of carriage of goods by sea (charter-party), Time charter party, Voyage charter party, Bareboat charter party; concept and elements of the contract, the contract parties. Contract on towing; Hamburg Rules;

<table>
<tr><td></td><td colspan="3">Rotterdam Rules. Transport by multiple carriers (direct and multimodal transhipment).
15. The concept of maritime average, legal sources. Common average; York-Antwerp Rules. Notion of marine insurance, marine insurance contract; institute clauses; premium and mutual insurance, liability insurance; P. & I. clubs.</td></tr>
<tr><td>Format of instruction</td><td colspan="2">☒ lectures
☐ seminars and workshops
☐ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td>☐ independent assignments
☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="3">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. A full-time student is required to attend at least 80% of lectures in order to take the exam and earn ECTS credits. Insufficient attendance (absence up to 20%) has to be compensated by performing individual assignments, so that 95% of STCW content is acquired. Students with insufficient attendance cannot take the exam and have to re-register the course in the following academic year.
Over the semester, students can pass the exam by taking three midterm tests covering the respective courses, or by taking the complete final exam (written and/or oral). Students who have fulfilled the course obligations but have failed or missed the midterm tests have to register for the final exam in the examination period. Students who have passed the midterms are 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:

A part-time student is required to attend 50% of lectures in order to take the exam and earn ECTS credits. In case of missing the classes comprising STCW content, the absence has to be compensated so that 95% of STCW content is acquired. Ways of taking the exam, as well as grading and evaluation criteria are identical for 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:

During the semester, students are continuously assessed through three written midterm tests. The first midterm comprises Lectures 1-5 and is held in the 6th week of the semester, the second comprises Lectures 6-10 and is held in the 11th week, while the third midterm test comprises Lectures 11-15 and takes place in the 15th week of the semester. Sample tests and exam questions are available at Merlin e-learning platform and at the end of every lecture. 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. If a student has missed / failed one of the midterm tests, he/she can re-take that test. Students who have fulfilled the</td></tr>
</table>

course obligations but have failed or missed two or three midterm tests have to register for the final exam in the examination period. The final grade is defined based on the student's attendance, activity in class and results of the midterms / final exam.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	10
Midterm test I	50	30
Midterm test II	50	30
Midterm test III	50	30

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)

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
R. Petrinović, N. Mandić, *Pomorsko pravo za zapovjednika broda*, Split, 2025.	10	

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

1. V. Barić Punda, D. Rudolf, jr, *Pravo mora*, Split, 2007.
2. I. Grabovac, R. Petrinović, *Pomorsko pravo – pomorsko javno, upravno i radno pravo*, Split, 2006.
3. I. Grabovac, *Suvremeno hrvatsko pomorsko pravo i Pomorski zakonik*, Split, 2005.
4. A. Luttenberger, *Pomorsko upravno pravo*, Rijeka, 2005.
5. B. Milošević Pujo, R. Petrinović, *Pomorsko pravo za jahte i brodice*, Split, 2008.
6. D. Pavić: *Pomorsko imovinsko pravo*, Split, 2006.
7. D. Pavić, *Pomorsko osiguranje – pravo i praksa*, Split, 2012.
8. Maritime Code of the Republic of Croatia, Official Gazette, No. 181/04, 76/07, 146/08, 61/11, 56/13, 26/15 and 17/19.
9. Teaching materials (MareLaw project) – https://marelaw.pfst.hr/lessons

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">SIMULATOR AND ONBOARD PRACTICE I</th></tr>
<tr><td>Code</td><td>PFS229</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Karlo Bratić, PhD
Ante Čalić
Igor Pavlović</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></td><td>60</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">Familiarize students with the principles of ship handling and watch-keeping, and prepare them for onboard practice (in the engine room), in accordance with STCW and SOLAS conventions.</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. Upon successful completion of the course, the students will have general knowledge and master basic methods, techniques, and skills that are necessary for handling marine engine systems, main engines, auxiliary engines and generators, boilers, separators, compressors, steering gear and other machinery onboard vessels at management level, in accordance with the requirements of STCW. All these systems are accessible in the existing simulators and onboard available vessels.
2. Interpret basic principles of management. Explain, organize and keep watch in the engine room in line with the STCW requirements.
3. Create and define the checklists in line with the ISM code.
4. Analyse various events in terms of risk or danger.
5. Organise work in a safe way.
6. Develop efficient communication among the engine room staff and team building.
7. Develop and integrate standard procedures for running the plant.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Exercises:
1. Familiarisation with marine engine simulator, its purpose and objectives. Description of the plant (list of machinery and associated systems – storage tanks, valves, pipeline systems, pumps, heat exchangers, fuel system, filters, electric generators, steam plant, main propulsion plant, control from the engine room, remote control of the propulsion unit).
2. Measurement gauges (pressure, temperature, level, volume-mass, flow, engine speed, power, voltage and electric power, CO2 and NOx contents, indicator diagram). Description of the simulated alarms. Preparation and starting of the emergency generator. Connecting the consumers on the emergency generator switchboard.
3. Preparation and starting the auxiliary systems of the sea and fresh water cooling, and the starting air system in emergencies.
4. Preparation of the fuel system. Preparation and starting the diesel generators No. 1 or No. 2. Checking all switches on the main and auxiliary 220 V switchboard. Starting the engine room ventilation. Checking the parameters of the diesel generators and safety conditions. Starting the main diesel generators in case of emergency. Parallel operation of the diesel generators.
5. Preparation and starting of the auxiliary system of the low and high temperature fresh cooling water. Preparation and starting of the starting air main compressors.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">6. Preparation and starting of the service air compressor. Preparation and starting of the ship's refrigerating plant and the accommodation air-conditioning system.
7. Preparation and starting of the oil-fired boiler.
8. Starting and connecting the diesel generators to run in parallel, distribution of the load. Switching of the oil-fired boiler from MDO to HFO.
9. Unplanned maintenance - detection and dealing with malfunction and failures in diesel generator systems.
10. Steam-turbine generator. Preparation, starting and operation of the turbo-generator. Connecting the turbo-generator to the electric power system (synchronisation of turbo-generators). Load share between turbo-generators and diesel-generators. Unplanned maintenance - detection and dealing with malfunction and failures in steam-turbine generator.
11. Turbines for driving cargo pumps. Preparation, starting and operation of the turbines for driving cargo pumps. Cargo pumps operation. Unplanned maintenance - detection and dealing with malfunction and failures in turbines for driving cargo pumps.
12. Main propulsion engine. Checking the system of the cooling sea water system (through heat exchangers). Checking the system of the cooling fresh water system (through the engine and heat exchangers). Checking the lubricating system (through the engine and heat exchangers). Checking the system of cylinder liner lubrication. Checking the fuel system. Checking the compressed air system. Engine revolution with open indicator cocks. Checking the bridge commands. Setting the fuel lever to the desired position.
13. Main propulsion engine: starting the main engine and monitoring the operational parameters of the running engine, including: lubricating oil temperature, cooling water temperature, exhaust gases temperature in individual cylinders, checking the temperature at the inlet and outlet of the turbo-charger, engine speed and shaft torque. Regular check of level in fuel tanks, regular check of fuel viscosity and fuel temperature. Following the orders from the bridge and recording changes in operational conditions. Unplanned maintenance - detection and dealing with malfunction and failures in the above systems.
14. Principle of evaporator operation. Types of deposits in the evaporators (caused by high and low temperatures). Operation of the evaporator at temperatures above and below 80°C and with working medium density above 96,000 ppm. Principles of decreasing deposits on the evaporator (low pressure including vacuum, magnetic purification-treatment, flexible elements, constant chemical treatment). Use of demister in the evaporator. Control of density in the two-stage evaporator. Automatic operation of the two-stage evaporator. Preparation and treatment of water and protection measures in preparing drinking water from the evaporator. Unplanned maintenance - detection and dealing with malfunction and failures in the evaporator.
15. Bilge system operation, waste waters, mud, deposits. International convention on releasing waste waters. Waste water system. Preparation of the liquid and solid waste for burning / incinerator.</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
☒ on-board training</td></tr>
<tr><td>Student responsibilities</td><td colspan="2">Students are obliged to attend at least 95% of the exercises, participate in the field work (100% attendance) and complete the seminar paper. The student shall not receive a certificate of fulfilment of the conditions for obtaining the Certificate of Additional Competence (according to regulations of Croatia's Ministry of the Sea, Transport and Infrastructure) if he was not present for more than 5% of the total</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">duration of the training program and if he did not attend the practical part of the training in full.</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>1.5</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>Simulator training</td><td>0.75</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.75</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
</table>
</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">
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>95</td><td>50</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>25</td></tr>
<tr><td>Assessment of the simulator skills</td><td>100</td><td>25</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>
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>V. Ozretić: Brodski pomoćni strojevi i uređaji, SSM, Split, 2004.</td><td></td><td></td></tr>
<tr><td>D. Martinović: Brodski strojni sustavi, Faculty of Maritime Studies in Rijeka, 2005.</td><td></td><td></td></tr>
<tr><td>M. Matković: Protupožarna zaštita na brodovima, Faculty of Maritime Studies in Rijeka, 1996.</td><td></td><td></td></tr>
<tr><td>D. Martinović: Brodski rashladni uređaji, Školska knjiga, Zagreb, 1994.</td><td></td><td></td></tr>
<tr><td>Grljušić, M.: Motori s unutrašnjim izgaranjem, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2000.</td><td></td><td></td></tr>
<tr><td>D. Martinović, P. Stanković: Sustav inertnog plina, Faculty of Maritime Studies in Rijeka, 1995.</td><td></td><td></td></tr>
</table>
</td></tr>
</table>

	Kongsberg Maritime: *ERS L115L90MC-VLCC, Operator's Manual, Machinery & Operations*, 2015.		
Optional literature (at the time of submission of study programme proposal)	Manuals on two-stroke and four-stroke marine engines.		
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 colspan="2">NAME OF THE COURSE</td><td colspan="5">BREAKDOWN AND FAILURE DETECTION</td></tr>
<tr><td>Code</td><td>PFS221</td><td>Year of study</td><td colspan="4">3</td></tr>
<tr><td>Course teacher</td><td>Đorđe Dobrota, PhD, assistant professor
Branko Lalić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="4">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="4">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Understanding the detection of failures as a procedure of identifying malfunctions that result in weakening the performance of marine engine systems and machinery. Familiarisation with the expert systems for the diagnostics of the state of marine engines and machinery.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended courses in “Marine auxiliary engines and machinery” and “Marine engines”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Distinguish and define the methods of detecting failures.
2. Distinguish basic notions used in failure analysis.
3. Connect the maintenance strategy according to the state of machinery with the application of the methods and techiques of monitoring (control) of the state of machinery. Explain the causes of failures in designing, manufacturing, assembling, transport, test run, operation, maintenance and revision.
4. Analyse failures in diesel engines.
5. Analyse failures in steam generators.
6. Analyse failures in steam and gas turbines.
7. Analyse faults and malfunctions resulting in failures in auxiliary engines and machinery.
8. Analyse failures in electric machines.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Purpose and concept of failure detection as a part of maintenance strategy according to the state of the systems. Diagnostics of failures – the essence and goals. Technical diagnostics. Methods of testing and control. Classification and features of the measurement devices. Errors in measuring.
2. Measurement and measurement system. Computer-aided measurement system. Instruments and devices. Measurement of time, speed, pressure, temperature, flow, level.
3. Use of sensors as the indicators of proper operation of marine engine systems and machinery. Categories and features of sensors.
4. Sensors of the heat and mechanical values. Features of modern marine propulsion and auxiliary machinery. Study and analysis of operation processes. Development trends.
5. Selection of relevant factors of the diagnostic measurement points. Effects and inter-relationship of the relevant factors.
6. Failure detection in marine auxiliary engines and devices: ship’s pump systems featuring volume and dynamic (centrifugal) pumps.
7. Failure detection in marine auxiliary engines and devices: Ship’s volume compressors. Analysis of the marine diagnostic systems: oil system.</td></tr>
</table>

	8. Requirements of the classification societies and IMO regulations on the monitoring of operation and safety of machinery and devices. 9. Analysis of the marine diagnostic systems in marine propulsion systems. Cooling agents systems. 10. Expert systems for diagnostics: notions and definitions. Expert systems for supervising and detecting failures in two-stroke slow-speed engines. Analysis of the marine diagnostic systems: air and exhaust systems. 11. Measuring of vibration, noise, power, induced pressure, and fuel consumption. 12. Analysis of failures in the smoke and water part of marine boilers. 13. Analysis of corrosive action in the cylinder of a two-stroke slow-speed diesel engine. 14. Analysis of the tribological system “cylinder liner / piston rings / piston” in a two-stroke slow-speed diesel engine. 15. Analysis of the crankshaft deflection. **Exercises:** 1. Application of the expert system for monitoring and diagnostics using the example of the ship engineering simulator Kongsberg Maritime. 2. Bearing testing device: An example of a computer system for monitoring, control and data acquisition (SCADA). 3. Bearing testing device: Examples of the sensors measuring the temperature, pressure and flow. 4. Bearing testing device: Examples of the sensors measuring the vibration and timing speed of the shaft. 5. Bearing testing device: Examples of the use of comparators for checking the shaft alignment. 6. Bearing testing device: Examples of the sensors measuring the density and viscosity of the liquid lubricant. 7. Analysis of the faults and failures in marine auxiliary engines and machinery. 8. Measurement of the crankshaft deflection.
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☒ field work ☐ independent assignments ☐ multimedia ☒ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	**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 can pass the exam by taking two midterm tests during the semester. Students who have fulfilled the class obligations but who have missed or failed the midterm exams, shall take the complete final exam. Students are assigned topics and issues to be explored through individual or team work, using the e-learning material. The student who has passed 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 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 criteria apply to both full-time and part-time students.

Screening student work *(name the*	Class attendance	1.125	Research		Practical training	

<table>
<tr><td rowspan="4">proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Experimental work</td><td></td><td>Report</td><td></td><td>(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>1.875</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">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>37.5</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>31.25</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>31.25</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>
Continuous assessment and grading of part-time students:
Their overall obligations cannot be less than 50% with regard to full-time students. The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><th colspan="3">Title</th><th>Number of copies in the library</th><th>Availability via other media</th></tr>
<tr><td colspan="3">Radica, G.: Dijagnostika brodskih strojnih sustava i uređaja, lectures, Faculty of Maritime Studies – University of Split, 2013.</td><td></td><td></td></tr>
<tr><td colspan="3">Lectures published online at Merlin e-learning platform.</td><td></td><td></td></tr>
<tr><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="5">1. H. Czichos, Handbook of Technical Diagnostics, Springer Verlag, 2013.
2. A. Kumar Mohanty, Machinery Condition Monitoring: Principles and Practices, CRC Press Taylor & Francis Group, 2015.
3. R. S. Figliola, Theory and Design for Mechanical Measurements, 6th Ed., John Wiley & Sons, 2015.
4. J. Fraden, Handbook of Modern Sensors: Physics, Designs, and Applications - Fourth Edition, Springer-Verlag, 2010.
5. D. Woodyard, Pounder's Marine diesel engines and gas turbines, Elsevier, 2004.
6. Instruction manuals on marine engines and devices.</td></tr>
</table>

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">CORROSION AND MATERIAL PROTECTION</th></tr>
<tr><td>Code</td><td>PFS118</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Gorana Jelić Mrčelić, PhD, full 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 colspan="2">F</td></tr>
<tr><td>30</td><td></td><td>0</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><th colspan="8">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="7">Familiarisation with the types and actions of corrosion, selection of materials and the application of anti-corrosion designs. Familiarisation with providing adequate protection against corrosion in maritime industry.</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. Define and classify the material destruction.
2. Define and classify corrosion of metals.
3. Analyse damage caused by corrosion.
4. Distinguish the types and forms of corrosion.
5. Describe the corrosive action.
6. Define and classify the anti-corrosion protection.
7. Describe corrosive properties of certain technical materials.
8. Analyse anti-corrosion designs and measures.
9. Compare the advantages and disadvantages of various anti-corrosion protection measures.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Lectures:
1. Damages to construction material. Degradation of materials: destruction of inorganic non-metal and organic materials. Corrosion, erosion, abrasion and cavitation. Economic effects of corrosion.
2. Corrosion of metals. Classification of corrosion processes. Corrosive action. Types of corrosion. Forms of corrosion.
3. Chemical corrosion.
4. Electro-chemical corrosion. Electrode potential of metals. Oxygen and hydrogen depolarisation. Corrosion flow rate. Control of corrosive processes.
5. Geometric forms of corrosion.
6. Corrosive properties of certain technical materials. Protection of metals by changing the composition and structure. Alloying. Non-alloyed ferrous metals.
7. Alloyed ferrous metals. Light metals. Non-precious non-ferrous heavy metals. Precious metals.
8. Protection against corrosion through the selection of materials. Design measures against corrosion. Examples of good and poor design solutions. Technology of production and corrosion.
9. Pre-processing of the metal surface. Preparation of the surface. Mechanical pre-processing. Chemical and electro-chemical pre-processing. Ultrasound pre-processing.
10. Protective paints and coating. Protective metal layers. Hot-dip coatings, thermal spraying, diffusion, vacuum deposition, from steam phase. Weld overlay. Ion plating. Galvanising. Coating with alloys. Galvnoplastic. Protective inorganic coatings on metals. Oxide, oxalate, phosphate and chromatic coatings. Galvannealing, Water-glass based coatings.
11. Cathode and anode protection. Cathode protectors. Electroplating. Anode materials.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">12. Protective organic layers. Pre-processing of the surface. Selection of the coating system. Viscosity, temperature and humidity. Coating thickness. Method of applying the coating agent. System of protective organic coatings. Types of protective organic coatings.
13. Corrosion inhibitors. Temporary protection. Conservation by means of protective oils and grease. Hydrophobicity. Protection using thermoplastic masses. Hermetisation. Inhibitors. De-humidification. Inert gases.
14. Protection of vessels against corrosion. Economic justification of protection.
15. Testing of corrosion and protection. Testing of protection efficiency. Field, plant and laboratory testing. Chambers. Sample selection. Quality testing of organic coatings. Testing of the cathode protection efficiency.</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 cannot take the exam and 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 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:

Full-time students with at least 80% of class attendance can register for the exam. Student’s performance is assessed over the semester (attendance, activity in class, midterm results) and/or at the final exam. Two midterm tests are held during the semester. Taking the midterms is not compulsory but the students who pass the midterms do not have to take the final written exam. To earn the final grade, a student has to achieve at least 50% of points on each midterm test or on the final written 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>25</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>
</td></tr>
</table>

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**
	G. Jelić Mrčelić: *Korozija i zaštita materijala*, e-textbook, 2021.		

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

1. Jarić, B. and Rešetić, A.: *Korozija, elektrokemijske osnove i katodna zaštita*, Zagreb, 2004.
2. Esih, I., Dugi, Z.: *Tehnologija zaštite od korozije*, FSB, Zagreb, 2001.
3. Zorović D.: *Zaštita materijala*, Faculty of Maritime Studies in Rijeka, 1991.
4. Shweitzer, A. P.: *What every engineer should know about corrosion*, Marcel Dekker Inc., New York and Basel, 1987.
5. Popić J., Zorović D.: *Vježbe iz zaštite materijala*, Faculty of Maritime Studies in Rijeka, 1987.

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">FUNDAMENTALS OF MARITIME TRAFFIC</td></tr>
<tr><td>Code</td><td>PFN119</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Zvonimir Lušić, PhD, Full Professor</td><td>Credits (ECTS)</td><td colspan="5">3</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Stipe Galić</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><td colspan="8">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="7">Get to know the concepts of the maritime market and the maritime economy. Get to know the basics of legal regulations related to ship safety and geometry. Obtain a routine in charting, determining the course and position of the ship. Master the basic principles of loading a ship. Learn the basic concepts of ship stability. Identify the types of ship, ship’s cargo and the type of cargo equipment on board. Particular attention should be paid to the propulsion and safe navigation of the ship.</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. Comment on the legal regulation of the international navigation safety system.
2. Use the acquired knowledge in practice with understanding.
3. Determine the course and position on the chart. Interpret the markings on the chart.
4. Interpret the stability calculation from the point of view of a proper and irregularly loaded ship.
5. Divide and categorize types of ship and cargo.
6. Analyse the concepts of ship geometry.
7. Pay special attention to the cargo facilities on board.
8. Use meteorological forecasts.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">Lectures:
1. Introduction to navigation.
2. Conventions and security.
3. Maritime development, categorization and types of merchant ships.
4. Dimensions. Main dimensions of the vessel.
5. Merchant ship equipment.
6. Navigation in general.
7. Aids in navigation.
8. The most basic concepts in coastal navigation.
9. Basic concepts in marine meteorology.
10. Basic rules for avoiding collisions at sea.
11. Freight handling devices.
12. Role of inspection services and ship registry.
13. Basic seamanship.
Exercises:
1-5. Plot the position of the ship on the chart.
5-6. Plotting the course.
7-9. Basic concepts (data) of the chart (variation, deviation, corrections).
10-12. Meteorological data.
13-15. Synoptic chart.</td></tr>
<tr><td></td><td colspan="3">☒ lectures</td><td colspan="4">☐ independent assignments</td></tr>
</table>

<table>
<tr><td>Format of instruction</td><td colspan="6">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☒ partial e-learning
☒ field work</td><td colspan="6">☒ multimedia
☐ laboratory
☐ work with mentor
☐ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="12">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 the midterm exam during the semester. In the event of insufficient attendance, students cannot take the exam and have to re-register the course in the following academic year.

Obligations of part-time students:
Attendance: at least 50% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits.</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>(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>1.875</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 colspan="6"></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="12">There is one midterm test that comprises the topics from the first to the 15th week of lectures. It is taken in the last week of the semester. The sample questions for the midterm test are available at Merlin e-learning platform. A student has to achieve at least 75% of points to pass the midterm exam. The final grade is formed as the combined value of the following parameters: class attendance, independent / team assignments, results of the midterm or final exam.

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>Attendance</td><td>80</td><td>7.5</td></tr>
<tr><td>Individual / team assignments</td><td>100</td><td>2.5</td></tr>
<tr><td>Midterm test</td><td>75</td><td>90</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>
The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
</table>

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Ivica Đ. Tomaš: *Sredstva pomorskog prometa*, University of Dubrovnik, 2011.		Yes
	R. Radulić, *Stručna praksa*, University of Zadar, 2011.		Yes
	Z. Furlan, N. Lučin, A. Pavelić: *Osnove brodogradnje*, Školska knjiga, Zagreb, 1989.		Yes
Optional literature (at the time of submission of study programme proposal)	1. D. Ugrinović: *Osnivanje broda I. dio*, Split 1977. 2. D. Ugrinović: *Osnivanje broda II. dio*, Split 1977. 3. I. Buljan: *Poznavanje broda i plovidbe*, Školska knjiga, Zagreb, 1974. 4. Uršić, J.: *Čvrstoća broda I, II i III dio*, FSB, Zagreb, 1991. 5. SEAGULL programs for e-learning. 6. VIDETEL films.		
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">MEDICINE FOR SEAFARERS</td></tr>
<tr><td>Code</td><td>PFP142</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Zlatko Kljajić, 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>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">Master the methods of providing medical first aid and medical care. Not harm when providing first aid and care. Check and secure the accident site. Make an orientation check-up of the injured or sick person and set up a working diagnosis. Apply immediate first aid procedures. Identify the state of real and apparent death. Apply reanimation when apparent death is identified. Determine the care priorities if there are more injured persons. Review the injured and sick, and set up a working diagnosis. Organization and implementation of medical care of the injured. Identify the symptoms of the most common illnesses. Assess when and how to administer medicines and when to change therapy. Identify the effect of drugs, determine the mode of administration and the most common side effects of medicines found in ship's pharmacy. Treat smaller wounds.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended course in "Basic safety and first aid" as part of the Supplemental study program, or holding the certificate of competence D19 – Medical First Aid (STCW VI/4-1).</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Assess the health of the injured or sick.
2. Carry out medical first aid in life-threatening situations.
3. Use basic medical equipment on board.
4. Interpret the requirement and implementation of the Radio-medical advice.
5. Identify life-threatening conditions and injuries, and apply first aid and medical care methods.
6. Identifying the various health conditions on board and using basic medical equipment and medicines onboard to perform appropriate procedures.
7. Assess when and how to give medicines, and when to change therapy.
8. Assess the need for transport by helicopter. Identify death marks (early and late death marks, apparent death, causes of death) and organize corpse disposal procedure (examination of the deceased body, corpse disposal procedure, sea funeral).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures
1. Introduction to Maritime Medicine. Basic concepts of maritime medicine. Significance and obligation to provide first aid on board. Difference in procedures and attitudes between first aid and care procedures at sea and on shore.
2. First aid. Conditions that require urgent intervention (arrest of respiration and heart failure, severe bleeding, shock and unconsciousness). Control of vital functions. Resuscitation. Familiarisation with a resuscitation mask and an oxygen appliance. Familiarisation with the means for stopping external bleeding.
3. Care for the injured: general principles of patient care. Head and spine injuries. Ear, nose, throat, and eye injuries. Internal and external bleeding. Nose pads,</td></tr>
</table>

	burns, scaldings and frostbite. Fractures, dislocations and sprains. Types of wounds, healing, wound treatment. Suppression of pain. Acute abdominal procedure. Small surgical procedures. Bandages and dressing. Blood pressure measurement; pulse measurement. Defining the position for administering intramuscular injection. 4. Care for the sick: pulse measurement, treating an infectious patient on board ship; treating a mentally ill person on board. Measurement of body temperature; measurement of urine volume. Procedure with infected wounds. Procedure of treating a rescued survivor. 5. Diseases: methods of acquiring and conveying an infection. Sexually transmitted diseases, tropical and contagious diseases, including intestinal infectious diseases. Methods of acquiring and conveying an infection. Clinical image and therapy. AIDS, hepatitis A, B, and C. Angina pectoris and heart attack. Acute abdomen. Measures to prevent and suppress contagious diseases. 6. Abuse of alcohol and drugs. Factors that lead to addiction. Damage to the organism caused by addiction. Prevention. Overdosage signs and first aid procedure. 7. Tooth care. Procedure with wound bleeding after tooth extraction, loss of filling and toothache procedures, swollen toothache, gingival irritation due to dental prosthesis. 8. Gynaecology, pregnancy and delivery. Menstruation, delayed menstruation, contraception. Pregnancy, complications and bleeding in pregnancy, ectopic pregnancy, early miscarriage, delivering a baby on board. 9. Medical care of the survivors including fatalities, hypothermia and pregnancy exposure. The procedure for a polytraumatized patient. Hypothermia and frostbite. Mechanisms of hypothermia and human organism's defence mechanisms from hypothermia. Procedure and care with unconscious hypothermia patient. 10. Death at sea. The signs of death, early and late signs of death, apparent death, causes of death, corpse procedure, corpse inspection, corpse disposal procedure, funeral at sea. ISM navigation procedures. 11. Help from third parties: radio-medical advice; transport of the injured and sick, including transport by helicopter; care of sick and injured seafarers, including cooperation with port authorities or healthcare institutions. ISM navigational procedures. 12. Environmental check on board. Ship's galley control, cleanliness control, ship's water supply, drinking water quality control, waste disposal procedure, measures for rodent destruction – deratization, insects - disinfection, harmful microorganisms - disinfection. Vaccination. ISM navigational procedures. 13. Prevention of infectious diseases. General measures for preventing infectious diseases, special measures for preventing infectious diseases, vaccination, prevention of diseases by preventive medication (chemoprophylaxis). ISM navigational procedures. 14. Regulations and log-keeping: keeping a health log; keeping narcotics book; familiarisation with the international maritime health regulations. Medications and medical equipment. Types of drugs - analgesics, antibiotics, antipyretics, spasmolytics, etc. Forms and ways of taking medication. Possible side effects and procedures in case of side effects. Anaphylactic (penicillin) shock and appropriate procedures when dealing with it. ISM navigational procedures. 15. Surgical equipment, instruments, and necessities. Getting to know surgical instruments. Small surgical procedures - wound treatment, incision. Procedures of asepsis and antisepsis. Maintenance of instruments. Use of different types of health counselling services. Familiarisation with possible ways of looking for health tips. ISM navigational procedures. **Exercises**

	1. Control of vital functions. Heart Rate Testing Procedure. Determining places for external heart massage. Performing an external massage of the heart to the puppets. Resuscitation demonstrated on a medical practice puppet. 2. Assistance in case of asphyxiation. Demonstration of artificial respiration ('kiss of life') method. 3. Familiarisation with the revival mask and the oxygen appliance. 4. Familiarisation with the means to stop external bleeding. Determining the location of digital compression as a method of stopping bleeding. 5. Immobilization in limb fractures, immobilization in suspected spinal injuries. 6. Procedure in open head injuries, open and closed burns procedure. 7. Treatment and sewing of wounds, disinfection of skin and wound environment, disinfectants for the skin, method of incision of the pleat. 8. Determine the pulse measurement spot. Testing of urine using test strips. 9. Blood pressure measurement. 10. Simulation of intramuscular injection. Determination of the place of administration. 11. Taking medical history. Check-up of patients. 12. Environmental check on board. Getting acquainted with the means and methods for disinfection and deratization. ISM navigational procedures. 13. Simulation of wound bleeding procure after tooth extraction, loss of filling and toothache procedures. 14. Familiarisation with drug forms and dosages. Familiarisation with the Ordinance on the minimum equipment and contents of the ship's pharmacy. Familiarisation with the procedures. 15. Requesting radio-medical advice, procedure, filling in forms. ISM navigational procedures.
Format of instruction	☒ lectures ☒ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities	**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 95% 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 can pass the exam by taking two midterm tests during the semester. Students who have fulfilled the course obligations but who have missed or failed the midterm exams, shall take the complete final exam in the examination period. The student who has passed the midterm exams is expected to register through the on-line service ("Studomat") in the first examination period to obtain the grade. **Obligations of part-time students:** The same criteria apply to both full-time and part-time students regarding their overall obligations, attendance requirements and ways of taking the exam.

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is*						
	Class attendance	1.125	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay	0.5	(Other)	
	Tests	1.375	Oral exam		(Other)	

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:

Students' activity in class is assessed over the semester. Students take **two written midterm tests.** The first test comprises Lectures 1-6 and is held in the 7th week of the semester, while the second comprises Lectures 7-15 and takes place in the 15th week of the semester. Sample tests and exam questions are available at Merlin e-learning platform and at the end of each lecture class. A student has to achieve **at least 60% of points to pass a midterm test**. In case a student passes both tests, he/she does not have to take the final exam. If a student has missed / failed one of the midterms for justified reasons, he/she can re-take that test in the 7th/15th week of the semester. If a student has missed / failed the first midterm, he/she cannot take the second midterm test. Instead, he/she has to take the complete **final exam**. Students who have fulfilled all course obligations but have failed or missed the midterm tests have to register for the final exam in the examination period. **The final grade** is defined on the basis of student attendance, seminar paper and midterm test results. 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
Seminar paper	100	16.66
Midterm test I	60	22.916
Midterm test II	60	22.916

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 to take the exam. 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
Mulić, R., Ropac, D.: *Medicina za pomorce*, Medicinska naklada, Zagreb 2003.		
International Medical Guide for Ships, 3rd edition, World Health Organization, Geneva 2007.		

Optional literature (at the time of

1. International maritime law embodied in international conventions.
2. International Health Regulations, World Health Organization Geneva, 2005.

submission of study 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)	In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.

<table>
<tr><th colspan="2">NAME OF THE COURSE</th><th colspan="6">STATISTICS</th></tr>
<tr><td>Code</td><td>PFP116</td><td>Year of study</td><td colspan="5">3</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">Laušić Marina</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><th colspan="7">COURSE DESCRIPTION</th></tr>
<tr><td>Course objectives</td><td colspan="6">Provide insights into the fundamentals of statistics and enable students to apply statistical methods for the purpose of determining, analysing and practical implementation of the principles of the observed phenomena in maritime shipping.</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. Classify statistical series.
2. Design data-bases.
3. Calculate the measures of the central tendency, dispersion, asymmetry and rounded values.
4. Assess the parameters of the basic set and test the hypotheses on parameters.
5. Analyse regression models.
6. Re-examine the validity of a trend model.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Essential notions in statistics. Statistical series.
2. Measures of the central tendency.
3. Measures of dispersion.
4. Measures of asymmetry and rounded values.
5. Basic notions of probability.
6. Random variable and the distribution of possibility.
7. Sampling method and sampling distribution.
8. Assessment of parameters.
9. Testing the hypotheses on a parameter.
10. Comparison of the basic set parameters.
11. Hi square test.
12. Regression and correlation.
13. Regression polynomial of the k-degree. Curvilinear regression.
14. Selected models of the time series.
15. Regression analysis, model trend.
Exercises (MS Excel):
1. Data management.
2. Calculation of mean values.
3. Calculation of dispersion measures and the BW diagram.
4. Calculation of asymmetry and rounded values.
5. Venn diagrams, trees of probability, conditioned likelihood.
6. Binomial, Poisson and normal distribution.
7. Sampling distribution, expected value, standard assessment error.
8. Estimations of parameters through a number and interval.
9. Testing the hypotheses on the mean and proportion of the basic set.</td></tr>
</table>

	10. Testing the hypotheses on the difference in means (proportions) of two basic sets. 11. Applying a Hi square test in form of distribution. 12. Model for a simple linear regression. 13. Curvilinear regression, transformations into a linear model. 14. Trend models, mobile averages, seasonal oscillations. 15. Processing of a trend model with the aid of regression analysis program.

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

Student responsibilities	**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 can pass the exam by taking 2 midterm tests during the semester. Students who have fulfilled the course obligations but who have missed or failed the midterm exams, shall take the complete final exam in the examination period. The student who has passed the midterm exams is expected to register through the on-line service ("Studomat") in the first examination period to obtain the grade. **Obligations of part-time students:** Part-time students have to attend at least 50% of lectures and 50% exercises. The same examination criteria 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 work	1
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	2.875	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:** Students' activity in class is assessed over the semester. Students take **two midterm tests (in Excel).** The first test comprises Lectures 1-7 and is held in the 8th week of the semester, the second comprises Lectures 8-15 and takes place 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 test**. In case a student passes one or two midterm tests, he/she takes only a partial final exam. If a student has missed or failed all midterms, he/she has to take the complete **final exam**. Students who have fulfilled the course obligations have to register for the exam in the examination period, through the on-line service ("Studomat"). During exercises, the performance of individual tasks in Excel is encouraged and additionally credited. **The final grade** is defined on the basis of student attendance, activity in class, midterm results and independent assignments. **Continuous assessment:**

Elements of assessment	Performance (min.%)	Participation in the final grade (%)

Class attendance	80	10
Independent assignments	50	10
Midterm test I	50	40
Midterm test II	50	40

Final assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Practical exam (in Excel)	50-100	60
Theoretical exam (written and/or oral)	50-100	30
Previous activities (including all indicators of the continuous assessment)	50-100	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:
Part-time students are required at least 50% of class attendance in lectures and 50% 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)	MareMathics; https://maremathics.pfst.hr/ Merlin; https://moodle.srce.hr/2021-2022/		
	Šošić, I.: *Primijenjena statistika* (2nd ed.), Školska knjiga, Zagreb, 2006.		
	B. Kovačić, *Zbirka riješenih zadataka sa grupnih konzultacija iz Vjerojatnosti i statistike*, Zagreb, 2018		
Optional literature (at the time of submission of study programme proposal)	1. Brink, D.: *Essentials of Statistics*, 2010, www.bookboon.com 2. Brink, D.: *Essentials of Statistics – exercises*, 2010, www.bookboon.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><th colspan="2">NAME OF THE COURSE</th><th colspan="6">INTERNSHIP</th></tr>
<tr><td>Code</td><td>PFS401</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Ladislav Stazić, PhD
Luka Vukić, PhD, Associate Professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td><td colspan="2">F</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td colspan="2">150</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><th colspan="8">COURSE DESCRIPTION</th></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">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="7">General learning outcomes:
1. Apply the knowledge and skills acquired throughout the undergraduate study programme in solving concrete business problems in the real-life working environment.
2. Create a Report in the performed internship, with the description of 5-10 completed business tasks, supported by relevant documents.

Specific learning outcomes:
1. Supervise, maintain and efficiently run the marine propulsion systems (marine diesel engines, steam and gas turbines, and steam boilers).
2. Plan and arrange procedures for the operation of the main engines, perform monitoring, assess efficiency and maintain safety of the operating machinery.
3. Control the operation of the marine engine and ballast water systems. Detect and eliminate the causes of their malfunction.
4. Plan and organize the operation of the electric, electronic, electric power devices, as well as the operation of the automatic control and supervision system; detect and eliminate the causes of their malfunction.
5. Calculate the trim, stability and stresses of the vessel’s hull.
6. Recommend the processes of the safe and efficient maintenance and recovery of the marine systems.
7. Plan and apply safety at work measures.
8. Interpret and critically assess the elements of the maritime legal regulations on the safety of life at sea and the protection of the marine environment.
9. Implement and maintain the safety of the vessel, crew and passengers, and carry out measures aimed at life-saving, fire-fighting, protection of other safety systems; also, plan and control the situations involving damage and emergencies.
10. Lead and control the engine room crew.
11. Familiarise with the essential seamanship, organisation of work on board, ship terminology and practice. Use professional Maritime English in practice, regardless of circumstances.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="7">The internship, i.e. professional practice, implies completing a number of concrete working tasks. They are performed with the support of the Teaching Base mentor and in cooperation with the Faculty of Maritime Studies in Split mentors. The duration of internship is 19 working days (150 working hours). The teaching base</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">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 schedule developed by the teaching base mentor. They have to follow the mentor's guidelines and carry out the tasks diligently and efficiently. Upon completing the internship, students have to make a Report (15 working hours) and defend it before the Faculty of Maritime Studies mentor and other 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></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>Consultations with the mentor</td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Data collection</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>Making a report on internship</td><td>0.3</td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>Defence of the report on internship</td><td>0.2</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 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).</td></tr>
</table>

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	The professional literature is defined by the Teaching Base mentor.		
Optional literature (at the time of submission of study programme proposal)	The professional literature is defined by the Teaching Base mentor.		
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">MARITIME ENGLISH V</td></tr>
<tr><td>Code</td><td>PFP106</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Tomislav Skračić, MA, senior lecturer</td><td>Credits (ECTS)</td><td colspan="5">2</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>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">Familiarisation with, and the use of, frequent language structures and technical and maritime vocabulary. Development of speaking, listening, reading, understanding, writing and cross-cultural skills with special focus on developing communication skills that marine engineers require in future professional environment.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended courses in “Maritime English III” and “Maritime English IV”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. In English language, describe the basic features of the fuel injection system; explain IMO and MARPOL regulations, requirements, technologies and applications referring to the reduction of harmful exhaust emissions.
2. Explain the purpose and the operation principle of the rpm regulator governor).
3. Name the essential components and describe the lubricating oil system (standard lube oil for engine’s running parts and the "total loss" system for lubricating cylinder liners).
4. Distinguish primary from secondary cooling water and name basic elements of the engine’s cooling system.
5. Describe the starting air system.
6. In English language, provide interpretation and information about the above topics. Create your own CV in EU format and write an Application for a job / scholarship / project participation; develop the skills necessary for life-long learning but also for resuming the studies at graduate level (use of dictionaries, online sources, etc.).</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. Fuel injection equipment.
3. Fuel oil system. Fuel types and properties.
4. Meeting MARPOL and IMO regulations regarding the reduction of CO2, NOx and other emissions (SCR, ACERT technology, B&W slide valves, water-and-fuel emulsion, biodiesel...).
5. Governor.
6. Technical terminology and grammar structures.
7. Lubricating oil system: introduction. Lubrication of the engine. Lubrication of the cylinder liners (total loss system).
8. Lubricating oil system. Priming. Auxiliary equipment of the lubricating system.
9. Technical terminology and grammar structures.
10. Water cooling system: purpose and components.
11. Water cooling system: primary and secondary coolants, water treatment.
12. Starting air system – how it works.
13. Starting air system – components, troubles, protection devices.
14. Technical terminology and grammar structures.
15. Review.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Exercises:
1. Review of Modal Verbs.
2. Time Clauses I.
3. Time Clauses I. MARPOL and IMO regulations on exhaust emissions from ships. ECA areas.
4. If – Clauses.
5. Language structures: Provided (that), Providing (that), On condition that.
6. Terms relating to failures and irregular operation. Phrasal verbs versus one-word synonyms.
7. MIDTERM test 1.
8. Sequence of Tenses.
9. Prepositions. Phrasal Verbs.
10. Verb "provide / to be provided".
11. Verb + Infinitive. Gerund. Past Participle. Written communication.
12. Verbs expressing the cause + object + Infinitive. Making reports.
13. Review of technical terminology and grammar structures.
14. Students' presentations (in PowerPoint).
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
☒ 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 (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, 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 50% of class attendance and whose absence has not been justified (illness, employment, apprenticeship, internship, on-board practice…) cannot take the exam and have to re-register the course in the following academic year.

Obligations of part-time students: are required at least 50% of class attendance (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, i.e. additional individual workload.</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>Activity in class</td><td>0.25</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>1</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>

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

Students can pass the exam by taking **two midterm tests** during the semester. A student has to achieve **at least 50% points to pass a midterm test**. In the examination period, they can re-take the midterm exam that they missed or failed. If a student has actively participated in class, he/she does not have to take the **oral exam**. Students shall take the oral exam in case of insufficient activity in class or if they do not agree with the final grade the teacher has suggested and would like to achieve a higher grade. Students apply for examination through the on-line service ("Studomat"). The final grade comprises the class attendance, results of the midterm tests or the final exam, and the activity in class.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance	80	37.5
Active participation	100	12.5
Midterm I	50	25
Midterm II	50	25

Final assessment

Assessment tools – final exam	Performance (min. %)	Participation in the final grade (%)
Written exam	50	50
Oral exam	50	30-50
Previous activities	80	0-20

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)

The same assessment and grading criteria apply to full-time, part-time and incoming Erasmus+ students.

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

Title	Number of copies in the library	Availability via other media
Spinčić, A., *An English Textbook For Marine Engineers II*., 4th amended ed., Faculty of Maritime Studies in Rijeka, 2009.	20	Yes
Skračić, T.: PowerPoint presentations available online at Merlin e-learning platform.	-	Yes
Luzer, J., Spinčić, A., *Gramatička vježbenica engleskog jezika za pomorce*, 3rd edition, Faculty of Maritime Studies in Rijeka 2003.	5	Yes

Optional literature (at the time of

1. Spinčić, A., Luzer, J. *Engleski u brodostrojarskim komunikacijama – English in marine engineering communications*, 3rd amended ed., Adamič, Rijeka 2007.

submission of study programme proposal)	2. Plančić, Bisera; Skračić, Tomislav: *Englesko-hrvatski pomorski rječnik / English-Croatian Maritime Dictionary*, Faculty of Maritime Studies in Split, 2017. 3. Selected articles from web-sites, papers and journals on marine engineering and manuals for operation, maintenance and repair of marine engines and machinery.
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">AUTOMATION OF MARINE ENGINE SYSTEMS II</td></tr>
<tr><td>Code</td><td>PFE108</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Joško Šoda, PhD, associate 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>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">Acquisition of knowledge necessary for understanding the operation principle of running the various automatic ship systems, their correlation, fusion of sensor information and integration of controlling systems supported by PLC devices or micro-controllers. Basic familiarisation with the hierarchical structure of onboard management. Understanding of hardware and program support to PLC devices. Interaction of man and PLC device using SCADA and HMI systems. Examples of automated systems on board vessels, based on the PLC support.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended and passed course in “Marine electrical engineering” and registered course in “Automation of marine engine systems I”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Classify the structure of managing ship's automated systems based on the use of PLC devices.
2. Analyse hierarchical structure of the process network at main levels.
3. Draw and explain the principle of operation of the programmable logic controller (PLC).
4. Develop the proposal of the project work for the automation of a marine system based on PLC use.
5. Identify potential logic errors using the PLC's program code, and eliminate them.
6. Present the fundamentals of the digital technique.
7. Classify basic and complex logic circuits.
8. Present the operation of the bistable circuit, counter, registers, multiplexers and de-multiplexers built from complex logic sets and add-drop (A/D) and drop-add D/A converters.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Input-output values of the processes and the most frequently used standards (4-20 mA, digital data transfer, 0-20 mA, 0-10 V, ±10 V). Electric loop.
2. Signal protection (voltage switches, operation amplifiers, Schmitt's trigger set, Zener diodes).
3. Hierarchical structure of ship management. Overview of the network use across the world (America, Europe, Asia). Level of monitoring, level of management and actuator-sensor level.
4. Overview of the management networks, field level: AS system. Historical development. Features of the AS network. Application advantages and shortcomings. Connecting the AS and PROFIBUS networks. Connecting the AS and PROFINET networks, i.e. direct connection.
5. Level of management. PROFIBUS: FMS, PA and DP, DeviceNet, MelsecMedoc, ProfiNet, CC-Link. Basic division of the PROFIBUS network. Topology of networks. Transfer speed. Protocols.
6. PROFINET level of monitoring. Basic division. Protocol TCP-IP. OSI model for data transfer. Protocols in the process networks, topology of networks, OSI model, RS-485, MBP means of data transfer in potentially risky areas of the</td></tr>
</table>

	vessel, transfer through optical fibres. Features and speed of the optical fibres network. 7. SCADA and HMI systems in management and basic standards of use. Interpretation of data and alarms. Example of the systems for monitoring the engine room and heeling / trim management. 8. Comparison of relay logic and PLC devices. Advantages of using PLC devices. Basic hardware structure of PLC devices. Protection of input/output signals and stages of PLC devices by using impedance transformers or optical sets. 9. Programming of PLC devices. Instructional ways of programming, scale programming and programming by function block diagrams. Basic and specialist commands in PLC scale programming. Basic rules of writing programs. 10. Specialised commands in programming of PLC devices. Processing the analogue inputs-outputs. Writing programs for analogue sensors. Use of analogue sensors for measuring pH values, temperature, pressure, movement and speed. 11. Use of development interface of Siemens PLC devices for configuration, programming and transfer of programs into and from PLC devices. Using advanced functions in programming for detecting errors in program codes. Testing of programs and elimination of potential logic errors. Using HMI TD-200 system for monitoring the process parameters in programming PLC devices. 12. Essential principles of digital technology. Boolean algebra of blocks, DeMorgan's rules, basic sets of digital technology (AND-set, OR-set and NO-set). 13. Complex logic sets (NEITHER-set, NOR-set) built in DTL, HCTL, TTL, MOSFET and CMOSFET integration scales. Comparison of individual integration scales. Consumption. 14. Micro-controllers and their use in onboard and port systems. Fundamentals of data transfer and the communication interface: micro-controller – PCAddition set, bistable circuits, counter, registers, multiplexers and de-multiplexers, PLD matrices implemented by using complex logic sets. Asynchronous and synchronous operation. 15. A/D conversion, D/A conversion (successive approximation and sigma-delta conversion). **Exercises:** 1. Introduction to the laboratory equipment and instruments. 2. Set structure of the Siemens S7-200 PLC device. Familiarisation with the ways of connecting PLC devices, import-export ports and ways of connecting them. 3. Program support to the Siemens S7-200 PLC device. Program package STEP 7 MicroWin 4.0. Familiarisation with the program package abilities. 4. Basic commands in PLC scale programming. Normally open and normally closed contacts. Types of export contacts. Examples of writing work sequences by using the above commands. Time programmer in a laundry washing machine. Draining and filling up the vessel. 5. Time counters and impulse counters. Writing a program code by using the above commands on the automated watering systems. 6. Work with data types: bytes, words and double words. Introduction to using a PLC device as a PID controller. 7. Analogue sensors and their programming in PLC devices. Examples of the program code when using analogue sensors for measuring pH values, movement, speed and temperature. 8. Automatic system of the steam turbine. 9. Automatic system in the centrally controlled engine.
	☒ lectures ☒ independent assignments

<table>
<tr><td>Format of instruction</td><td colspan="6">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="2">☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="8">Obligations of full-time students:

Records of attendance are kept as attending lectures and exercises is compulsory. A full-time student is required to attend at least 80% of lectures and auditory exercises in order to take the exam and earn ECTS credits. Insufficient attendance (up to 3 lectures) has to be compensated by performing additional assignments (seminar papers), covering the missed classes and learning matter. Seminar papers are graded as “passed” or “failed”. Students who have missed more than 3 lectures cannot take the exam and have to re-register the course in the following academic year.
Students can pass the exam in two ways. They can be evaluated through continuous assessment (i.e. by taking laboratory exercise midterm exams, completing a seminar paper, and oral exam). Seminar papers on a given subject can be carried out through e-learning, individually or as a team work. Alternatively, students can apply for a complete written and oral exam in the examination period after the semester.
Students who have achieved sufficient results over the classes are expected to register through the on-line service (“Studomat”) in the first examination period to obtain their grade or to take a supplementary exam in case they would like to achieve a higher grade.

Obligations of part-time students:

They have to attend at least 50% of lectures and auditory exercises. The same continuous assessment or final exam criteria 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>1</td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td>1.875</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="8">Over the semester, the students are assigned a seminar task that they have to carry out and defend. The seminar task comprises a proposal for the automation of a part of the marine system, with the use of PLC devices. The student describes the system, defines the actuators and sensors, and suggests a program sequence developed in the Siemens program package TIA Portal. In addition to the seminar task, students take a midterm test upon completing the laboratory exercises. Finally, at the end of the semester, the students who have defended the seminar task and passed the midterm, take the oral exam where they are given three questions. Their responses have to be at least 45% accurate (see “Elements of assessment”). Each response is assessed on the scale from 0 to 10. The final grade is based on the arithmetic mean of all achieved results.
Alternatively, students can pass the exam by taking the complete written and oral exam in the examination period. The written part includes the computer skills, where a student is given a task to create a simple program sequence in the Siemens program package TIA Portal. Upon passing this stage, the student takes the oral exam, where he/she is given three questions. The responses have to be at least 45% accurate (see “Grading”). Each response is assessed on the scale from 0 to</td></tr>
</table>

10. The final grade is based on the arithmetic mean of the achieved written and oral exam results.
When the final grade is defined, the student registers the exam via the online service ("Studomat"). The grade is entered into the online service in the examination period.

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	80	28.125
Midterm test and laboratory exercises	45	46.875
Seminar task	100	25

Grading:

Points (%)	Criterion	Grade
0-45	Performance does not meet the minimum criteria	Insufficient - fail (1)
45-59	Performance meets the minimum criteria	Sufficient (2)
60-69	Generally sound work, with a number of notable errors	Good (3)
70-85	Performance above the average standard, with some errors	Very good (4)
85-100	Outstanding performance	Excellent (5)

The same continuous assessment or final exam 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
Antonić, R.: *Automatizacija broda II*, Faculty of Maritime Studies in Split, 2007.	10	Yes
Antonić, R.: *Brodostrojarski simulator PPS2000 – upute za korištenje*, Faculty of Maritime Studies in Split, 2001.	10	Yes
Beroš, S. M.: *Programibilni logički regulatori, Bilješke za pripremu predavanja*, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2010.		Yes
Šoda, J.: *Automatizacija brodskih strojnih sustava II, Bilješke za pripremu predavanja i ppt prezentacije*, Faculty of Maritime Studies in Split, 2012.		Yes
P. Slapničar: *Impulsna i digitalna tehnika*, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2001.	10	
U. Peruško: *Digitalni sustavi*, Školska knjiga, Zagreb, 2005.		

Optional literature (at the time of submission of study programme proposal)	1. T. I. Fossen: *Marine control systems - guidance, navigation and control of ships, rigs and underwater vehicles*, Marine Cybernetics, Trondheim, Norway, 2002. 2. Christopher T. Kilian: *Modern control technology: components and systems*; 2nd edition, Delmar Thompson Learning, 2000. 3. Siemens, SIMATIC, S7-200 PROIGRAMMABLE CONTROLLER, System Manual, Edition 05/2003. 4. Hackworth, R. J., Hackworth, D. Federick Jr.: *Programmable logic controllers: programming methods and applications*, Prentice-Hall, USA, 2003. 5. Bryan, L. A., Bryan A. E.: *Programmable controllers: theory and implementation, 2nd ed.*, An Industrial Text Company Publication, Atlanta, Georgia, USA, 1997. 6. Scott, D. M.: *Industrial process sensors*, CRC Press, 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="6">MARINE POWER ELECTRONICS</td></tr>
<tr><td>Code</td><td>PFE224</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Ivan Pavić, PhD, associate professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Nur Assani</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><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">The course deals with the components and basic sets of the analogue and digital electronics with special focus on the components and sets of the power electronics such as rectifiers, commutators, direct-current and alternating-current converters that are used in the vessel's electric power plant. Familiarisation with the procedures of measuring and detecting failures in electronic sets.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">• Previously attended courses in “Marine electrical engineering” and “Onboard electro-technical systems I”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Present the basic physical principles of semi-conductors.
2. Identify and analyse the basic electronic components.
3. Draw the layouts and compare the operation of various analogue and digital sets.
4. Present essential principles of electric power conversion.
5. Understand basic operation principles of the AC/DC, D/AC, DC/DC and AC/AC converters.
6. Identify the disturbances in the network, which are produced by the converters and find ways of eliminating them.
7. Draw and explain the layouts of synch-converters and cyclo-converters.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Area of the marine power electronics. Electric power conversion. Structure of the electronic power converter.
2. Passive components (resistors, capacitors, transformers). Active components (power diode), static and dynamic characteristic.
3. Active components: SCR (thyristor), gate turn-off thyristor (GTO), energy bi-polar junction transistor (BJT), 3-terminal fully-controllable switch (JFET). Static and dynamic characteristics and parameters.
4. Active components: MOSFET, IGBT, MCT. Static and dynamic characteristics and parameters.
5. Protection of the components of power electronics, problem of EM disturbances, heat properties of the components.
6. Analogue electronic sets – amplifiers, oscillators, filters. Frequency characteristic and stability.
7. Operation amplifiers – ideal and real amplifier. Basic sets of the operation amplifiers (non-inerting and inverting amplifiers, adders, Miller integrator).
8. The operational principles of the AC/DC, DC/AC, DC/DC and AC/AC converters. Efficiency and power factor of the converter.
9. Rectifiers (AC-DC). Introduction to rectifiers. Development and topology of single-phase and triple-phase rectifying sets. Comparison of the rectifying sets.
10. Network induced converters, autonomous converters. Basic diagrams, wave forms.
11. Introduction to direct-current converters (DC-DC). Descending DC converter. Ascending DC converter.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">12. Descending-ascending DC converter. DC converter with galvanic separator.
13. Introduction to AC/AC converters. Operation principle of the alternating-current converter of voltage and frequency. Synchronous converters. Vector control.
14. Cyclo-converters. Matrix converters, application in electric motor drives.
15. Basic measurement techniques and the diagnostics of failures in electronic sets. Introduction to repairing faults in the electronic power sets.

Exercises:

1. Basic analogue components. Functional testing of the semi-conducting elements.
2. Basic analogue components. Functional testing of the semi-conducting elements.
3. Basic analogue sets. Functional testing of the analogue electronic sets.
4. Basic analogue sets. Functional testing of the analogue electronic sets.
5. DC/AC converters.
6. DC/AC converters.
7. AC/DC converters.
8. AC/DC converters.
9. DC/DC converters.
10. DC/DC converters.
11. AC/AC converters.
12. AC/AC converters.
13. Speed regulation of the electric motors.
14. Speed regulation of the electric motors.
15. Uninterrupted power supply.</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 80% in exercises in order to take the exam and earn ECTS credits. Over the semester, individual home tasks are assigned to students. The correctly performed assignments have to be completed and delivered as proof of active participation in class. The home assignments are considered completed and delivered when they are assessed as successful, i.e. meeting the minimum criteria. The students attending classes and completing their assignments shall be deemed to have fulfilled obligations. The students who have not fulfilled the obligations cannot take the exam and 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 50% in exercises. Other requirements 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>(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>
</table>

<table>
<tr>
<td>Grading and evaluating student work in class and at the final exam</td>
<td>
Assessment and grading of full-time students:

Two midterm tests are held during the semester. The first midterm test comprises theoretical matter included in Lectures 1-7 and is held in the 7th week of the semester. The second comprises theoretical matter included in Lectures 8-15 and takes place in the 15th week. 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. If a student has missed / failed one of the midterm tests, he/she can re-take that test. The final grade is defined on the basis of student attendance and midterm test results. Students who have fulfilled course obligations but have failed or missed the midterm tests have to register for the final written exam in the examination period. 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>18.75</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>40.625</td></tr>
<tr><td>2nd midterm test</td><td>50</td><td>40.625</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 and 50% in 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>D. Kezić: Energetska elektronika (internal script) www.pfst.hr</td><td></td><td></td></tr>
<tr><td>B. Kezić: Energetska elektronika – sveučilišni priručnik za simulacijske vježbe, ISBN: 978-953-6655-41. http://www.pfst.hr</td><td></td><td></td></tr>
<tr><td>T. Brodić: Osnovi energetske elektronike 1. dio, Školska knjiga, Zagreb, 2002.</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>
1. J. G. Kassakian, Martin F. Schlecht, George C. Verghese: Topologije i funkcije pretvarača I dio, Graphis, Zagreb, 2000.
2. Mohan, Undeland, Robbins: Power Electronics – Converters, Applications and Design, John Wiley & Sons Inc, 2003.
</td>
</tr>
</table>

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 HYDRAULICS AND PNEUMATICS</td></tr>
<tr><td>Code</td><td>PFS223</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Đorđe Dobrota, 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">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Learn the basic physical properties and technical requirements that the working media have to fulfil in hydraulic and pneumatic operation. Distinguish operation characteristics and construction designs of hydraulic pumps, air compressor, hydraulic and pneumatic actuating and control elements (valves). Develop logic approach when analysing and solving practical engineering problems related to handling onboard hydraulic and pneumatic systems.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended and passed course in “Technical mechanics II”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Distinguish basic physical properties and technical requirements that the working media have to fulfil in hydraulic and pneumatic operation.
2. Analyse and distinguish the elements of hydraulic and pneumatic systems according to their design and application, and draw their symbols.
3. Analyse and interpret hydraulic and pneumatic control schemes.
4. Independently formulate and drew examples of hydraulic and pneumatic control schemes.
5. Identify failures and apply the acquired skills for removing failures and malfunction in onboard hydraulic and pneumatic systems.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures
1. Introduction. Basic notions of hydrostatics and hydrodynamics. Basic designs of hydraulic systems. Structure, elements and layout of hydraulic systems.
2. Hydraulic liquids. Basic physical properties of hydraulic working fluids: viscosity, density, compressibility, heat expansion. Chemical properties that hydraulic working liquids require. Cavitation and hydraulic impact.
3. Elements of the hydraulic system, Categorisation, operational parameters and technical characteristics of hydraulic pumps.
4. Control of pressure, flow and power of the variable displacement hydraulic pumps.
5. Hydraulic actuators. Translation actuators. Single-acting, double-acting and telescopic cylinders. Rotary actuators: gear, vane, axial and radial piston motors.
6. Hydraulic control elements. Categorisation of control elements and their symbols. Pressure valves. Flow control valves. Check valves. Controlling with pressure and flow control valves. Proportional valves. Servovalves.
7. Directional control valves. Marking and categorisation of directional control valves. Design of directional control valves (seat and slide types). Principle of operation of directly and indirectly actuated directional control valves.
8. Hydraulic equipment. Oil reservoir. Pipelines and connections. Filters, their function, types and building-in. Coolers. Hydraulic accumulators.
9. Design of hydraulic systems. Categorisation of hydraulic systems according to ways of control. Hydraulic control schemes. Guidelines for designing hydraulic systems.</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">10. Hydraulic function schemes. A typical hydraulic circuit for power transmission, speed control, pressure control, energy storage, blocking position of cylinders and synchronization of cylinders.
11. Pneumatics. The use of pneumatics and display pneumatic systems. Production and preparation of compressed air.
12. Elements of pneumatic systems. Actuators (cylinders and rotary motors). Control elements (directional, pressure, flow and check valves).
13. Basic pneumatics control schemes for controlling actuators. Logical connection. Sequence control depending on positions of the cylinder.
14. Time-dependent control. Pressure-dependent control.
15. Examples of the design of marine hydraulic and pneumatic systems.

Exercises

1. Experimental measurement of Q-p characteristics of hydraulic pumps and defining the volumetric pumping efficiency of the hydraulic pump.
2. Experimental measurement of Q-p characteristics of the pressure relief valve.
3. Hydraulic circuit for speed control. Practical exercise.
4. The hydraulic pressure control circuit. Practical exercise.
5. Hydraulic circuit for blocking the position of the cylinder. Practical exercise.
6. Hydraulic circuit for the synchronization of work. Practical exercise.
7. Hydraulic servo systems. Implementation of hydraulic servo systems to controllable pitch propeller and steering gear.
8. Energy circuit of pneumatic single and double acting cylinder. Practical exercise.
9. Indirect control of single and double acting cylinder. Practical exercise.
10. The implementation of control depending of the way and time. Practical exercise.
11. Realization of logical function "OR" in the pneumatic control. Practical exercise.
12. Realization of logical function "AND" in the pneumatic control. Practical exercise.
13. Realization of logical function "NO" in the pneumatic control. Practical exercise.
14. Pressure-dependent control. Practical exercise.
15. Example of the pneumatic control system for running the two-stroke low-speed marine diesel engine.</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 for full-time students:

Records of attendance are kept as attending lectures and exercises is compulsory. Full-time students have to attend 95% of lectures and 100% of exercises. Students who attended more than 80% of classes are allowed, in case of justified absence, to compensate the classes with consultation and/or seminar papers. If they fail to do so, they have to re-register and attend the course in the following academic year in order to take the exam and earn ECTS credits. Students can take 2 midterms during the semester and are expected to take these tests. Students who have fulfilled course obligations but who have missed or failed the midterm tests, shall take the complete final exam in the examination period. Students who have obtained enough points have to apply for examination through on-line service (“Studomat”) in the first examination period to have their grade entered in the service, or to take a supplementary exam in case they would like to achieve a higher grade.

Obligations for part-time students:</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">Total obligations of part-time students cannot be less than half of those specified for full-time students. Exercises and practical part of the course have to be entirely completed. Students cannot take the exam if their attendance in lessons and practical part was not sufficient.</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>1</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:

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 2 midterm tests in the semester. The first comprises Lectures 1-6 and is held in the 7th week, while the second midterm test comprises Lectures 7-14 and is held in the 15th week of the semester. Sample 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 for justified reasons, can re-take the midterm test. The midterm tests can be re-taken by students who achieve less than 50% in both tests. In case of a student has fulfilled course obligations but has failed or missed the midterm tests, he/she has to take the final written tests in the examination period. The final grade comprises the class attendance in lectures and exercises, and the results of the midterm tests. 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>95</td><td>28.125</td></tr>
<tr><td>1st midterm test</td><td>50</td><td>35.937</td></tr>
<tr><td>2nd midterm test</td><td>50</td><td>35.937</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>

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="3">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
</table>

library and via other media)	G. Nikolić: *Pneumatika i hidraulika I dio*, Pneumatika, Školske novine, Zagreb, 2008.		
	G. Nikolić: *Pneumatika i hidraulika II dio*, Hidraulika, Školske novine, Zagreb, 2008.		
	A. Šestan: *Uljna hidraulika i pneumatika*, Faculty of Maritime Studies, Rijeka, 2003.		
Optional literature (at the time of submission of study programme proposal)	1. V. Koroman, R. Mirković: *Hidraulika i pneumatika*, Školska knjiga, Zagreb, 1992. 2. H. L. Stewart: *Hydraulic and Pneumatic Power for Production*, Fourth Edition, Industrial Press Inc., New York, 1976. 3. A. B. Goodwin: *Fluid Power Systems, Theory, worked examples and problems*, The Macmillan Press Ltd., London, 1976.		
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 colspan="2">NAME OF THE COURSE</td><td colspan="6">WORK ORGANIZATION AND MANAGEMENT ON BOARD</td></tr>
<tr><td>Code</td><td>PFN314</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Srđan Vukša, 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>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">Familiarise with the organisation of multi-national crew featuring cultural and sociological differences. Learn to plan on-board activities. Provide insights into appropriate behaviour in emergencies and crises. Learn the ways of leadership (commanding).</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. Organise the crew members and plan onboard activities and drills on board vessels.
2. Identify specific situations that are potentially dangerous on board vessels (e.g. stress, alcohol, workload, excessive authority etc.) and analyse the personality and demeanour of seafarers (their attitude, values, authority, positive initiative).
3. Design a good or poor organisation structure of workposts on board a vessel.
4. Analyse cross-cultural differences in multi-national crew and, taking this into consideration, organise the work in an optimal way.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Onboard management structure. Organisation of duties and responsibilities on board vessels. Organisation of maritime companies. Relation company – ship – company. Duties of crew members on various merchant vessels.
2. Ergonomics and design of vessels, human errors due to automation. Types of errors. Statistics of the errors resulting in distress. Causes of errors. Human error. Consequences. On-board familiarisation. Film: Eastern Air Lines Flight 401. Case study: Royal Majesty. Case study: Denver Blast Wave.
3. Attitudes, values, personality and other qualities of the crew members. Implementation of ISM Code (International Safety Management Code). Keeping and hand-over of the watch. Contracts for seafarers according to ITF. Situational awareness. Film: Test your awareness - Who dunnit.
4. Organisation of exercises and drills on board ship. Abandon ship drill. Fire drill. Frequency of drills. Other drills and exercises in compliance with ISM regulations. Importance of performing drills and keeping relevant records. Bridge and Engine Room Standing Orders, Night Order Book, types of the watch, organising the watch in emergencies.
5. Fatigue, planning of working time, ILO convention on on-board workload. Minimum Manning Document. Watch rota and working time modes. Effects of outside factors on fatigue. Consequences of fatigue.
6. Seafarers' contracts in line with the ITF.
7. Stress, fears, human limits. Hidden pressure. Pressure exerted by the company. Motivation. Detecting the unexpected. Films: Intuitions about perception, CSB Safety Video: Death in the Oilfield. Case studies: MV Rena Disaster, Torrey Canyon.
8. Mobbing, abuse of drugs and alcohol.
9. Short-term strategy, leadership, types of leadership, authority, positive initiative.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">10. Authority. Ways of management. Danger of refusing advice. Crisis management. Case study: MV Maersk Kithira.
11. Communication on board vessels. Decision-making under exceptional circumstances. Conducting effective meetings.
12. Teamwork. Management errors. Statistics of the impact of teamwork feeling on the crew. Relations among ship departments. Case studies: MV Moondance, MV Figaro/Camargue.
13. Cross-cultural differences and hurdles, sociological differences (individualism, collectivism, patronising, short and long distance from power, male and female communities). Case study: Arahura. Specific characteristics of some maritime nations: China, Japan, the Philippines, Croatia, the Balkans (Serbia, Bosnia and Herzegovina, Albania).
14. Analysis of fatalities due to errors. Errors on highly-automated ships.
15. MCRM program package.

Exercises:

1. Human features and limits.
2. Attitudes.
3. Situational awareness.
4. Cross-cultural differences and hurdles.
5. Communication and meetings.
6. Authority.
7. Advice and response.
8. Short-time strategy.
9. Working time.
10. Humans and automation.
11. Teamwork.
12. Error management.
13. Modes of management.
14. Decision-making.
15. Ocean Learning Platform (OLP) CBT – check of the results.</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
☒ MCRM program package</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. Students have to perform the MCRM program exercise. Full-time students are required at least 80% of class attendance in lectures and 100% in exercises in order to take the exam and earn ECTS credits. In order to acquire a certificate for obtaining STCW license, full-time students are required at least 95% of class attendance in lectures and 100% in exercises.

Obligations for part-time students:

Total obligations of part-time students cannot be less than half of those specified for full-time students. In order to acquire a certificate for obtaining STCW license, full-time students are required at least 95% of class attendance in lectures and 100% in exercises.</td></tr>
<tr><td rowspan="3">Screening student work (name the proportion of ECTS credits for each activity so that the</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>CBT</td><td>0.675</td><td>(Other)</td><td></td></tr>
<tr><td>Essay</td><td></td><td>E-learning</td><td>0.2</td><td>(Other)</td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">total number of ECTS credits is equal to the ECTS value of the course)</td><td>Midterm tests</td><td>2</td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written and oral exam (alternative to midterm tests)</td><td>2</td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">
Active participation in class is encouraged and monitored throughout the semester. Instead of the midterm, students can take the early test at the end of the semester, before the official examination period. A student has to achieve at least 50% of points to pass a midterm / early test. If the student has fulfilled other course obligations, he/she obtains the grade that is entered in the student online service (Studomat) in the first examination period. The final grade comprises the class attendance, result of the midterm / early test and individual / team assignments (MCRM, OLP and Case Studies). In case a student has fulfilled course obligations but has failed or missed the midterm / early test, he/she has to take the final written exam in the examination period. The written exam is replaced by the oral exam if the exam is taken by less than 5 students.

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>80-100
(95-100)*</td><td>15</td></tr>
<tr><td>MCRM CBT</td><td>85</td><td>15</td></tr>
<tr><td>E-learning</td><td>85</td><td>15</td></tr>
<tr><td>Exam (Midterm / Early / Written / Oral)</td><td>50</td><td>55</td></tr>
<tr><td>Midterm test</td><td></td><td></td></tr>
</table>
* to acquire a certificate for obtaining STCW license.

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="2">Title</td><td colspan="2">Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td></td><td colspan="2">Student Workbook, MCRM Maritime Crew Resource Management, OAA, 2010.</td><td colspan="2"></td><td>YES</td></tr>
<tr><td></td><td colspan="2">P. Vidan: Nastavni materijali, Faculty of Maritime Studies in Split.</td><td colspan="2"></td><td>YES</td></tr>
</table>

	Ocean Learning Platform CBT		YES
Optional literature (at the time of submission of study programme proposal)	1. Captain A. J. Swift: *Bridge Team Management*, 2nd Edition, FNI, 2004. 2. Various authors: *Bridge Watchkeeping*, 2nd Edition, 2003. 3. R. A. Cahill: *Strandings and their Causes Captain*, FNI, 2002. 4. R. Jeffery: *Leadership Throughout*, MNI, 2007.		
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 colspan="2">NAME OF THE COURSE</td><td colspan="6">SHIP'S RESISTANCE AND PROPULSION</td></tr>
<tr><td>Code</td><td>PFS233</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Marko Katalinić, PhD, associate 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">/</td></tr>
<tr><td colspan="7">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="6">Acquiring competencies for understanding and implementation of complex activities within onboard service, which are related to the understanding of ship's resistance and elements of the ship's propulsion.</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. Describe the phenomena related to flow of water around the ship's hull.
2. Distinguish the components of ship's resistance and explain the methods for determining ship's resistance.
3. Explain the influence of the hull design and attachments on the resistance of the vessel.
4. Analyse the calculation of the resistance of a given craft.
5. Describe the main features of marine propulsion units and explain their operation.
6. Explain the forces and momentum acting in the vessel's propeller.
7. Explain the characteristics of the vessel's propeller.
8. Explain the relations between the resistance and propulsion.
9. Explain the inter-relation between the prime mover and the propeller.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. General introduction to the ship hydrodynamics, resistance and propulsion. Mathematical models, ship motion equations, motion freedom degrees, forces acting on a vessel, vessel's features, motion characteristics, characteristics of fluids, air and environment. Basic characteristics and physical properties of liquids. Phenomena in still liquids (hydrostatics and moving liquids (hydrodynamics).
2. Streaming of a liquid around a solid body, ideal liquid flow, flow of a real / viscous liquid, liquid flow types, streaming around a vessel's hull, formation of wake.
3. Model testing pools, model testing techniques. Froude's law of similarity. Mechanical / geometric / kinematic / dynamic similarity. Non-dimensional models. Modes of sailing and equations of seaworthiness.
4. Ship resistance – introduction. Basic elements of resistance. Froude's categorisation of ship's resistance; additional resistance elements.
5. Friction resistance – introduction. Friction resistance coefficient, boundary layer and friction. Flat plate friction formulae: Froude, Hughes, Schoenherr and I.T.T.C. 1957. Roughness and fouling of the hull, effect of general roughness on the boundary layer streaming.
6. Viscous pressure resistance. Resistance of a form, viscous resistance, resistance of the attachments to the hull. Resistance in restricted water depth and breadth. Effects of the bulbous bow.
7. The analysis of waves. Wave resistance – introduction. Waves in deep water, vessel's wake, interference of waves. Effects of the environment, air resistance and wind.</td></tr>
</table>

	8. General notions about propulsion devices. Definitions and brief description of the components of propulsive efficiency. 9. Marine propeller geometry and design parameters. Dimensional analysis and propeller coefficients. 10. Free surface, free screw propeller drive. Diagram of screw series, propulsion disc theory, propulsion disc efficiency. 11. Model testing of screw propellers. Similarity in hydrodynamics. Serial tests of screw propeller models. 12. Mutual influence of the vessel's hull and propeller. Real and apparent slip stream of the propeller. Effects of the hull, co-streaming, propulsion efficiency rate, approximate values of the propulsion components. 13. Cavitation: outline of origins and effects; preliminary cavitation criterion and choice of blade area ratio. Cavitation types, forms, erosion, adverse impacts. 14. Optimization of the trim aimed at the optimization of resistance and fuel saving. Screw propeller acoustics. Basic notions. Humming and noise of the screw. Design of a marine propeller, design stages, project goals, project procedures. Specific aspects of marine propulsor designing. 15. Calculation of the marine propeller strength. Design, manufacturing and maintenance of marine propellers. Special types of propulsors. Location of propulsors across the vessel's hull. Controllable pitch propellers. Devices for improving the propulsor's operation. **Exercises:** 1. Physical values and measurement units. Environmental conditions, characteristics of a vessel, dimensional analysis. 2. Similarity laws, sailing modes, friction resistance, speed distribution, boundary layer and friction. 3. Hull fouling and corrosion, resistance of local roughness, resistance of waves, trochoid wave. 4. Viscous pressure resistance. Form factors, resistance of the attachments to the hull, resistance of air and wind, resistance of heavy seas. 5. Resistance in confined and shallow waters. Schlihting method, determining the overall vessel's resistance. Methods of Froude, Telfer, I.T.T.C. 57, Hughes (1954), Prohaska (1966), Hughes – Prohaska, I.T.T.C. 78. 6. Calculation of the propeller's pitch, angle, angle ratios, surface ratio, radius of the propulsion screw propeller. 7. Interaction of the hull and propeller, experiment of free propeller drive, experiment of the stand-alone drive. 8. Coefficients of streaming and absorption. Analysis of the hull's form. 9. Design of a marine propeller, design stages. 10. Drive features of the marine diesel engines. Typical tasks when designing the screw propeller using diagrams. 11. Specific aspects of marine propulsor designing. High-speed craft and issues they create. Selecting a propulsor type for fast vessels. 12. Towing boats. Kort nozzle, shallow water craft, special-purpose vessels. 13. Calculation of the marine propeller strength. Modern approaches to the issues of strength. 14. Design, materials, manufacturing and maintenance of marine propellers. 15. Special types of propulsors. Essential features of individual propulsor types. Devices for improving the propulsor's operation.
Format of instruction	☒ lectures ☐ seminars and workshops ☒ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work ☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other)

<table>
<tr><td>Student responsibilities</td><td colspan="6">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. At least 80% of class attendance in lectures and 100% in exercises. Insufficient attendance has to be compensated by assignments, i.e. additional individual workload. Students who have missed lectures due to illness must have a valid medical document proving their health issues. Students who have achieved less than 80% of class attendance cannot take the exam and have to re-register the course in the following academic year. Students can pass the exam by taking two midterm exams during the semester. In the examination period, they can re-take only one midterm exam that they missed or failed. If a student fails both midterm exams, he/she has to take the complete exam (written and oral).

Obligations for part-time students:

Total obligations of part-time students cannot be less than half of those specified for full-time students. The same ways and requirements for taking the exam apply both to 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>1.875</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">There are two midterm exams in the semester. The first comprises Learning outcomes 1-4 and is held in the 8th week, while the second midterm test comprises Learning outcomes 5-9 and is held in the 14th week of the semester. Examples of the tests are available at Merlin e-learning platform and at the end of each lecture. 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 for justified reasons are allowed to re-take that test. Students who have fulfilled course obligations but have not managed to pass the midterm test, have to take the final written exam in the examination period. The final grade comprises the class attendance, evaluation of the seminar paper, results of the midterm tests or the final written test, and the result of the oral examination. The same evaluation criteria apply for the continuous assessment of student achievements and for the final examination.

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>Class attendance</td><td>80</td><td>20</td></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>
</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>50-62.4</td><td>Performance meets the minimum criteria</td><td>Sufficient (2)</td></tr>
<tr><td>62.5-74.9</td><td>Generally sound work, with a number of notable errors</td><td>Good (3)</td></tr>
<tr><td>75-87.4</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>
<table>
<tr><td>87.5-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>

Assessment and grading 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>Gamulin, A.: Otpor i propulzija broda, Zagreb, 1998.</td><td></td><td></td></tr>
<tr><td>Ljubetić, M.: Otpor i propulzija broda, Faculty of Maritime Studies – University of Dubrovnik, 1989.</td><td></td><td></td></tr>
<tr><td>Radan, D.: Uvod u hidrodinamiku broda, Faculty of Maritime Studies – University of Dubrovnik, 2004.</td><td></td><td></td></tr>
<tr><td>Šilović, S.: Otpori propulzija broda, Institute of Marine Research & Advanced Technologies, Zagreb, 1968.</td><td></td><td></td></tr>
<tr><td>Tabain, T.: Njihanja broda na nepravilnim valovima, Institute of Marine Research & Advanced Technologies, Zagreb, 1972.</td><td></td><td></td></tr>
<tr><td>Vučinić, A.: Hidromehanika broda, Otpor broda u mirnoj vodi, Faculty of Engineering in Rijeka, 2000.</td><td></td><td></td></tr>
<tr><td>Vučinić, A.: Hidrodinamika plovnih objekata (Otpor i propulzija), Faculty of Engineering in Rijeka, 1997.</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. Tipper, E.: Introduction to naval architecture, Butterworth-Heinemann, Oxford, 1996.
2. Bertran, V.: Practical ship hydrodynamics, Butterworth & Heinemann, 2002.
3. Tehnička enciklopedija. Dio 2, Brod, Otpor. (Part 2: Vessel, Resistance)
4. Tehnička enciklopedija, Dio 2, Propulzija. (Part 2: Propulsion)</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">SIMULATOR AND ONBOARD PRACTICE II</th></tr>
<tr><td>Code</td><td>PFS230</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">4</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Karlo Bratić, PhD
Ante Čalić
Igor Pavlović</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></td><td>60</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">Prepare students for onboard practice, in accordance with STCW and SOLAS conventions.</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, the students will acquire practical familiarisation with vessel, engine room and its systems, and will master basic methods, techniques, and skills in preparing, managing and supervising the ship's propulsion plant and auxiliaries when in port and under way, as well as in the event of malfunction or breakdown.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Exercises:
1. Design and equipment of the lifeboat and the rescue boat, individual components of their equipment. Individual features and gear of lifeboats and rescue boats.
2. Various gear for lowering and launching the lifeboats and rescue boats. Methods of launching a lifeboat into rough seas.
3. Methods of finding a lifeboat. Actions to be taken prior to abandoning ship. Methods of launching and lifting a rescue boat in rough seas.
4. Methods of starting and controlling the lifeboat engine and its auxiliaries. Using a dedicated fire-fighting apparatus. Methods of launching and lifting a rescue boat in rough seas.
5. Actions to be taken to maximise the possibility of detecting and finding a lifeboat. Distribution of food and water in the lifeboat.
6. Use of lines, ropes, anchors and other gear. Handling a lifeboat in stormy weather. Method of rescuing by helicopter.
7. Effects of hypothermia and its prevention: use of protective covers and clothing, including water-protective suits and thermo-protective items.
8. Using the rescue boat and motor lifeboat for liferaft arrangement and rescuing the survivors at sea. Stranding a lifeboat.
9. Use of the first-aid kit and resuscitation techniques. Addressing the injured persons, including haemorrhage stopping and wound treatment.
10. Radio rescue devices on board a lifeboat, including radio beacon for positioning in emergency and SAR responder. Emergency flare and torch. Emergency procedure. Measures for preventing the pollution of the marine environment.
11. Detection and dealing with malfunction and failures in: fuel injection timing.
12. Detection and dealing with malfunction and failures in: liner wear in one of the cylinders, fire in the scavenge air manifold.
13. Detection and dealing with malfunction and failures in: turbo-blowers (suction and pressure side), scavenge air heat exchanger, voltage in the main power busbars.
14. Detection and dealing with malfunction and failures in: dirty filters, overheated main bearings, circulating pumps.</td></tr>
</table>

15. Detection and dealing with malfunction and failures in: overflooded bilge tank, bridge command failure. Unplanned maintenance – detection and dealing with malfunction and failures in the above systems.

Note:

Attending practical training onboard the training vessel "Naše more" or “Kraljica mora” or onboard one of the ships operated by Jadrolinija company. The goal is to familiarise students with the vessel, her safety systems, the engine room and its systems, and with future tasks in their professional environment. The onboard training is performed in the 5th or 6th semester, in line with the provisions of the Ministry of the Sea, Transport and Infrastructure of the Republic of Croatia.

Format of instruction

☒ lectures	☐ independent assignments
☐ seminars and workshops	☐ multimedia
☒ exercises	☐ laboratory
☐ *on line* in entirety	☐ work with mentor
☐ partial e-learning	☒ Assessment of the simulator skills
☐ field work	

Student responsibilities

Students are obliged to attend at least 95% of the exercises, participate in the field work (100% attendance) and complete the seminar paper.
The student shall not receive a certificate of fulfilment of the conditions for obtaining the Certificate of Additional Competence (according to regulations of Croatia’s Ministry of the Sea, Transport and Infrastructure) if he was not present for more than 5% of the total duration of the training program and if he did not attend the practical part of the training in full.

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

Class attendance	1.5	Research		Practical training	
Experimental work		Report		Activity in onboard training	0.5
Essay		Seminar essay		(Other)	
Midterm tests	2	Oral exam		(Other)	
Written exam		Project		(Other)	

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

Continuous assessment:

Elements of assessment	Performance (min.%)	Participation in the final grade (%)
Class attendance	95	37.5
Activity in onboard training	100	12.5
Midterm test 1	100	16.66
Midterm test 2	100	16.66
Midterm test 3	100	16.66

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>

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>V. Ozretić: Brodski pomoćni strojevi i uređaji, SSM, Split, 2004.</td><td></td><td></td></tr>
<tr><td>D. Martinović: Brodski strojni sustavi, Faculty of Maritime Studies in Rijeka, 2005.</td><td></td><td></td></tr>
<tr><td>M. Matković: Protupožarna zaštita na brodovima, Faculty of Maritime Studies in Rijeka, 1996.</td><td></td><td></td></tr>
<tr><td>D. Martinović: Brodski rashladni uređaji, Školska knjiga, Zagreb, 1994.</td><td></td><td></td></tr>
<tr><td>Grljušić, M.: Motori s unutrašnjim izgaranjem, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 2000.</td><td></td><td></td></tr>
<tr><td>D. Martinović, P. Stanković: Sustav inertnog plina, Faculty of Maritime Studies in Rijeka, 1995.</td><td></td><td></td></tr>
<tr><td>TRANSAS: ERS5000 MAN B&W 6S60MC-C Diesel Engine – Tanker LCC, Trainee Manual, 2014.</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>Manuals on two-stroke and four-stroke marine engines.</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">AUTONOMOUS SHIPS</td></tr>
<tr><td>Code</td><td></td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Rino Bošnjak, PhD, associate professor
Ranka Petrinović, PhD, full professor with tenure
Anita Gudelj, PhD, full professor
Marko Katalinić, PhD, associate professor
Hrvoje Dodig, PhD, associate professor
Helena Ukić Boljat, PhD</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>45</td><td></td><td>0</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">Familiarisation with new technologies and their benefits, the role of digitisation of maritime operations involving autonomous vessels, artificial intelligence, self-taught engines and the human-engine interaction.
Recognising the elements that are essential for remote control and management – network safety, networking, classification, qualification and the perspective of safety.
Acquiring knowledge about new STCC control centres (present VTS centres), their management hierarchy and services they provide (their networking with the onboard autonomy levels).
Familiarisation with the particularities of cargo loading / discharge in the ports featuring automated transhipment facilities.
Introduction to the international by-laws, recommendations, guidelines and standards related to the training of seafarers for running autonomous ships, depending on the vessel's autonomy level.
Familiarisation of students with the cutting-edge technologies and their implementation at various levels of the ship autonomy.</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. Identify and explain the classification and characteristics of various levels of the ship autonomy.
2. Discuss the technologies applied on autonomous vessels.
3. Distinguish and compare the level of the present ship autonomy with the expected ship autonomy in the future.
4. Classify the artificial intelligence, autonomous engines and the human-engine interaction.
5. Classify and plan the principles of remote control according to the autonomy level.
6. Present the role of e–Navigation and continuously follow its development and potential enhancement.
7. Explain and define the classification and safety perspectives of the autonomous vessels.
8. Interpret the level and ways of applying the network safety and networking.
9. Interpret the legal framework and regulatory challenges.
10. Explain the economic factors affecting the development of autonomous ships.</td></tr>
</table>

<table>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Operations at sea and the influence of autonomous vessels (the fourth revolution in shipping) on the operations at sea, including the new business models in transport.
2. Application of advanced technologies on autonomous ships and definition of their development stages.
3. New Ship Traffic Control Centers (STCC) for monitoring the navigation of autonomous ships. Integration of new STCCs.
4. Defining the needs of new technologies and various solutions required for independent ships.
5. The autonomous ship concept.
6. Implementation and further development of e-Navigation with regard to autonomous ships.
7. Autonomous ships, automation and control (present-day level of automation). The expected changes in the future.
8. Artificial intelligence, independent machines, human-machine interaction.
9. Application of AI on autonomous vessels.
10. Remote controlling.
11. Cyber threats, safety and security on autonomous vessels.
12. Network safety and networking.
13. Classification, qualification and safety perspectives.
14. Maritime legislation, legal perspectives and regulations on autonomous vessels.
15. Economic factors affecting the development of autonomous ships.</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
☒ work with the simulator</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 whose attendance is insufficient but over 70%, and whose absence was caused by illness or other justified reason, are allowed to compensate for the missed classes by attending supplementary classes during or after the semester, but not later than one month after the completion of the course. Other students, i.e. those with less than 70% of attendance, cannot take the exam and 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.</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>Individual assignments</td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Simulator work assessment</td><td>0.5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td>0.5</td><td>On-line CBT training and test</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></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Grading and evaluating student</td><td colspan="6">Taking the exams:</td></tr>
</table>

<table>
<tr><td>work in class and at the final exam</td><td>
Upon meeting all requirements, i.e. upon passing the midterm theory and exercise tests, students can take the oral exam. The students who have passed the midterm theory tests through Merlin e-learning platform do not have to take the oral exam. The students who have failed or missed the midterm exercise tests have to take the final written exam, provided that they have met the requirements.
The midterms (as parts of the exam) are taken exclusively during classes through Merlin system, whereas the complete final exam is taken during the examination period. If a student passes only some of the midterm exercise tests, and has met all other requirements, he/she can take a partial final exam of the module(s) that have not been mastered. Online CBT training is performed over the semester.
Total time available to complete the midterm theory test: 1 class hour.
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:
<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>20</td></tr>
<tr><td>Midterm test 1</td><td>50</td><td>30</td></tr>
<tr><td>Midterm test 2</td><td>50</td><td>30</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>10</td></tr>
<tr><td>On-line CBT training and test</td><td>75</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>
<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>
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>Autonomous Ships - The Next Step, Ship, Intelligence Marine, Rolls-Royce.</td><td></td><td>Yes</td></tr>
<tr><td>M. Höyhtyä; J. Huusko; M. Kiviranta; K. Solberg; J. Rokka: Connectivity for autonomous ships: Architecture, use cases, and research challenges, IEEE, 2017.</td><td></td><td>Yes</td></tr>
<tr><td>Roberts G. N., Sutton, R., Advances in Unmanned Marine Vechiles, IET control engineering series.</td><td></td><td>Yes</td></tr>
<tr><td>Gary C. Kessler, Steven D. Shepard: Maritime Cybersecurity: A Guide for Leaders and Managers, September 2, 2020</td><td>1</td><td>Yes</td></tr>
</table>
</td></tr>
<tr><td>Optional literature (at the time of submission of study</td><td></td></tr>
</table>

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)	In case of interest, classes can be performed in English language, with the accreditation issued by the University of Split.

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="6">BACHELOR EXAM</td></tr>
<tr><td>Code</td><td>PFS400</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Course teachers holding scientific-teaching titles</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Course teachers holding scientific-teaching titles</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></td><td>10</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">The student shall:
• systematise the theoretical knowledge and practical skills acquired during the undergraduate study program;
• present essential insights, ideas and concepts in public.
• pass the Bachelor Exam before the members of the Committee.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">In order to take the Bachelor Exam for earning the BSc degree, the student has to attend and pass all registered courses within the undergraduate curriculum and, if applicable, to meet all requirements of the undergraduate courses comprised in the Introductory supplemental programme.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">After completing the Bachelor Exam, the student will be able to present the acquired specific knowledge and skills in one or more of the following areas:
1. Monitoring, maintenance and efficient running of the marine propulsion systems (diesel engines, steam and gas turbines, steam boilers).
2. Planning and arranging procedures for operation, monitoring, efficiency assessment and maintenance of the safety of the vessel’s prime mover and auxiliary machinery.
3. Control of the marine engine and ballast water systems, detection and addressing the causes of malfunctions in these systems.
4. Planning and organization of the operation of the electric, electronic and electric engineering systems, as well as the automated control and monitoring systems, and detection and addressing the causes of their malfunctions and failure.
5. Calculation of the trim, stability and stresses of the ship’s hull.
6. Recommendation of the processes for ensuring the safe and efficient maintenance and repair of the ship systems.
7. Planning and implementation of safety at work measures.
8. Interpretation and critical evaluation of the elements of maritime legislation aimed at the protection of life at sea and the marine environment preservation.
9. Implementation and maintenance of the safety of the vessel, crew and passengers; introduction of life-saving, fire-fighting and other safety measures; planning and management of the events involving emergencies or damages.
10. Engine room crew leadership and management.
11. Standard seamanship, organisation of work on board, maritime terminology and practice, practical use of Maritime English in all circumstances.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">The Bachelor Exam is prepared and performed in cooperation with the supervisor and the Committee members.</td></tr>
<tr><td>Format of instruction</td><td colspan="3">☐ lectures
☐ seminars and workshops
☐ exercises</td><td colspan="3">☒ independent assignments
☐ multimedia
☐ laboratory</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="2">☒ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="8">The student carries out an independent preparation for the Bachelor Exam with the aid of the database of the questions available on Merlin e-learning platform. The database of questions consists of various areas corresponding to the selected topic of the thesis and the respective undergraduate courses.</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></td><td>Research</td><td></td><td>Practical training</td><td></td><td></td><td></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Preparation of the final exam</td><td>1.5</td><td></td><td></td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>Defence of the final exam</td><td>1.5</td><td></td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td>1</td><td>(Other)</td><td></td><td></td><td></td></tr>
<tr><td>Written exam</td><td>1</td><td>Project</td><td></td><td>(Other)</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="8">The students shall comply with the guidelines provided by the Defence Committee, and shall carry out the set tasks efficiently.
The members of the Committee shall evaluate the Bachelor Exam.</td></tr>
<tr><td rowspan="5">Required literature (available in the library and via other media)</td><td colspan="5">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="5">Literature and other sources in line with the courses associated with the Bachelor Exam.</td><td></td><td></td></tr>
<tr><td colspan="5"></td><td></td><td></td></tr>
<tr><td colspan="5"></td><td></td><td></td></tr>
<tr><td colspan="5"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="8">Literature and other sources in line with the courses associated with the Bachelor Exam.</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="8">Teaching process monitoring performed by the Faculty (Quality Management System in compliance with ISO 9001).</td></tr>
<tr><td>Other (as the proposer wishes to add)</td><td colspan="8"></td></tr>
</table>

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">TECHNICAL MEASUREMENTS</td></tr>
<tr><td>Code</td><td>PFS232</td><td>Year of study</td><td colspan="4">3</td></tr>
<tr><td>Course teacher</td><td>Tina Perić, PhD, associate professor</td><td>Credits (ECTS)</td><td colspan="4">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>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">Basics of measurement, producing measurement results and calculating measurement uncertainty. SI-units and theoretical basics of measuring essential physical values. Measurement in technological processes: insights into measurement instrument designs and using them, ways of reading and gathering data, calculation using measurement instruments, analysis and interpretation of measurement results. Croatian legislation regarding measurement, provisions from essential regulations and by-laws in the area of measurement. Making technical reports on performed measurements. Control and measurement plans.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">Previously attended and passed course in “Graphic drawing in marine engineering”.</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="6">1. Use basic SI units, derived and permitted measurement units.
2. Calculate measurement uncertainties in the performed measurements.
3. Determine the method of measurement in a marine engineering plant.
4. Analyse and interpret the results of the performed measurement.
5. Categorise a product based on the measures and the requirements the product has to meet.
6. Make a product quality program on the basis of measurement.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures and exercises:
1. Introduction to the measurement technique and its importance.
2. Development of measurement and units of measuring values, international system of measurement units – SI system.
3. Measurement of physical values. Principles of measurement and control. Measurement uncertainty. Analysis of measurement errors.
4. Processing the measurement results.
5. Causes of measurement uncertainty and errors. Procedures of determining measurement uncertainties.
6. Measurement of length and angles.
7. Measurement of temperature.
8. Measurement of pressure.
9. Measurement of speed.
10. Measurement of flow rate.
11. Measurement of level.
12. Measurement of humidity.
13. Measurement of force and momentum.
14. Measurement of vibrations.
15. Measurement of heat conductivity.</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="6">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☐ field work</td><td colspan="6">☐ multimedia
☐ laboratory
☐ work with mentor
☒ practical work</td></tr>
<tr><td>Student responsibilities</td><td colspan="12">Obligations of full-time students:

Records of student attendance are kept as attending lectures and exercises is compulsory. At least 80% of class attendance in lectures and 90% in exercises. Student activity in class is continuously assessed over the semester through their technical reports on performed measurements. The reports have to be correct and carried out in a transparent way. Students who have attended classes and made all technical reports can take the exam. Students who have not met these requirements cannot take the exam and have to re-register the course in the following academic year.

Obligations for part-time students:

Obligatory class attendance of part-time students cannot be less than 50%. Other requirements are the same as for the 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>1.875</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="12">The final grade comprises the class attendance, activity in class, and results of the midterm tests or the final written and oral exam. There are two midterm exams in the semester, held in the 8th and 15th week. 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 for justified reasons are allowed to re-take that test in the first examination period. Students who have passed both midterms do not have to take the written part of the final exam. Others have to apply for the complete final exam in the examination period.

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>Class attendance</td><td>80</td><td>37.5</td></tr>
<tr><td>Midterm test I</td><td>50</td><td>31.25</td></tr>
<tr><td>Midterm test II</td><td>50</td><td>31.25</td></tr>
</table>

Grading:

<table>
<tr><th>Points (%)</th><th>Criterion</th><th>Grade</th></tr>
<tr><td>0-50</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>80-94</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>95-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
</td></tr>
</table>

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Barjamović, N.: *Brodska mjerenja*, Fakultet za pomorstvo, Kotor, 2006	3	
Optional literature (at the time of submission of study programme proposal)	1. *Inženjerski priručnik - 1. knjiga: Temeljni pojmovi,* Chapter 11: *Mjeriteljstvo, pp. 951-1042*, Školska knjiga, Zagreb 1996. 2. Bego, V.: *Mjerenja u elektrotehnici*, Tehnička knjiga, Zagreb 1991. 3. Farago, F. T.; Curtis, M. A.: *Handbook of Dimensional Measurements*, Industrial Press Inc. New York, 1994. 4. Profos, P.; Pfeifer, T.: *Handbuch der industriellen Messtechnik*, R. Oldenbourg Verlag, München – Wien, 1994.		
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">LIQUID CARGO TRANSPORT TECHNOLOGY</td></tr>
<tr><td>Code</td><td>PFN304</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Srđan Vukša, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Mario Bakota, 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>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">Learn specific technologies of transport of liquid cargo by sea, as well as international regulations, codes, recommendations and standards related to technology of liquid cargo transport. Familiarize with the commercial and technical management of liquid cargo carriers and their typical markets. Acquire knowledge and skills to work on board liquid cargo carriers.</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. Explain and interpret the characteristics of technology of liquid cargo transport by sea.
2. Familiarize with international rules, codes, recommendations and standards relating to the technology of liquid cargo transport.
3. Recognize different types of ships for the transport of liquid cargo, their equipment, and the potential hazards and protective measures.
4. Analyse and interpret the procedures for cargo handling on tankers (crude oil and petroleum products, chemicals, liquefied gases, etc.).
5. Plan and carry out loading / discharging / transport of liquid cargo.
6. Apply appropriate safeguards in working with liquid cargo, and plan actions in emergencies.
7. Analyse methods of managing liquid cargo carriers and their typical markets.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Historical development of transportation of liquid cargoes by sea, international rules, regulations, recommendations and standards relating to the technology of transport of liquid cargo.
2. Transport of crude oil and products by sea, historical development of crude oil carriers, a description of the tanker, the development of the construction of tankers, longitudinal and mixed construction, double shell plating, cofferdams, VLCCs and ULCCs, cargo tanks.
3. Transport of crude oil and products by sea, explosion triangle, the most common causes of disasters on tankers, tanker equipment (cargo pipeline, cargo pumps, heating pipes, types of cargo valves).
4. Transport of crude oil and products by sea, inert gas system: (gas cleaner, ventilators, main stop valve, deck water seal, inert gas distribution line), inert gas generator.
5. Transport of crude oil and products by sea, inerting cargo tanks by displacing and mixing, degassing, cargo handling (loading, transport, discharge), washing tanks with water and crude oil (COW), drying tanks, checklists - transshipment of crude oil offshore.
6. Chemical tankers. Construction of chemical carriers, rules and regulations for the construction of ships.
7. Chemical tankers. GESAMP and NAS system, the structure and number of tanks, tank construction materials and protective coatings, MARPOL.</td></tr>
</table>

	8. Chemical tankers. Chemical properties of the cargo, taking and storing samples, cargoes that cause corrosion, reactivity and compatibility of cargo, the minimum conditions that must be met for loading certain cargo (IMO Code). 9. Chemical tankers. IMO types of ships, transport and cargo handling, cargo manifold, valves and cargo pumps, P / V valves, ventilation towers, tank inspection by chemical analysis of the tank plating, washing tanks (pre-cleaning, cleaning, washing, steam blowing, rinsing and drying). 10. Chemical tankers. Cargo handling (heating load, ventilation of cargo tanks, recirculation, cooling), nitrogen cover, safety in the transport and handling of cargo, fire hazard, risk to human health, MDK-TLV (maximum permissible concentrations of gases, vapours and dust), safety measures during loading and discharging of cargo, interruption of operations. Cargo Record Book, cargo plan, manifold plan, daily monitoring of cargo. 11. Transport of liquefied gases by sea. Historical development of LNG tankers, the rules of construction of LNG system, spherical and membrane tanks for liquefied natural gas (Moss Rosenberg, Gas Transport, Technigaz, CS1), a comparison of spherical and membrane tanks. 12. Transport of liquefied gas by sea. Installations on LNG ships (pipes and fittings for closing safety valves, pumps for cargo discharge, ship's compressor station, gas heaters and evaporators). 13. Transport of liquefied gases by sea. Preparing the ship for loading cargo, loading plan and discharge plan, cooling ship's lines for cargo loading. 14. Transport of liquefied gases by sea. Ballasting and deballasting the ship, cargo control room, inerting tanks, cargo inspection during the trip, safety measures and risks in LNG transport. 15. Final considerations on the transport of liquid gases by sea. Largest tanker disasters in history, analysis of the impact of human factors on the handling and transport of cargo. STCW requirements in the transport of liquid cargo, preventing pollution by MARPOL, education and training of ship crews. **Exercises:** 1. Transport of crude oil and products by sea: making the preliminary and final cargo plan. 2. Transport of crude oil and products by sea: preparing the ship for loading. 3. Transport of crude oil and products by sea: handling the cargo pipelines and valves, hydraulic shock, preventing the pollution of the marine environment. 4. Transport of crude oil and products by sea: ballast water, stresses on the ship's hull during ballasting and deballasting. 5. Transport of crude oil and products by sea: inerting cargo tanks, degassing, cargo handling, washing tanks, drying tanks, checklists. 6. Transport of crude oil and products by sea: calculation of the loaded / discharged amount of cargo, API. 7. Transport of crude oil and products by sea. Calculation of the ship's trim and stability. 8. Chemical tankers. IMDG Code, taking and storing samples, the minimum conditions that must be met for loading certain cargoes (IMO Code). 9. Chemical tankers. Determining the atmosphere contents in the tanks and confined spaces, transport and handling of cargo, examples of loading cargo. 10. Chemical tankers. Cargo Record Book, cargo plan, manifold plan, daily monitoring of cargo. 11. Chemical tankers. Types and properties of individual chemical cargoes, restrictions, procedures of releasing liquids into the sea. 12. Transport of liquefied gases by sea, examples of loading cargo, calculation of the ship's trim and stability. 13. Transport of liquefied gases by sea. Preparing the ship for loading cargo, loading plan and discharge plan, TRIP TEST, cooling the ship's holds by onboard and terminal-based pumps and using LNG from the terminal, topping, finishing the loading of cargo.

<table>
<tr><td></td><td colspan="6">14. Transport of liquefied gases by sea. Ballasting and deballasting the ship, cargo control room, inerting tanks, cargo inspection during the trip, safety measures and risks in LNG transport.
15. STCW requirements in the transport of liquid cargo, preventing pollution by MARPOL, education and training of ship crews.</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 for full-time students:

Students need to obtain sufficient points for minimal requirements to pass. They have to attend at least 80% of classes (lectures and exercises) and 100% (95%) of classes related to training in order to apply for the exam and earn ECTS credits. In case of insufficient attendance students cannot take the exam.
Absenteeism cannot be justified by excuses in form of written documents. Students who have met the training attendance requirements by 80% or more due to illness or other justified reason, will be able to compensate for the missed classes during supplementary classes during or after the semester, but not later than one month after the completion of regular classes. Other students, i.e. those with less than 80% of attendance, cannot take the exam and have to re-register the course in the following academic year.

Obligations for part-time students:

As for training classes, the same criteria apply to part-time and full-time students. Attendance of other classes is at least 50% and the rest of requirements, up to 80%, can be compensated during or after the semester, but not later than one month after the completion of regular classes.</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.125</td><td>Research</td><td></td><td>Practical training</td><td>1</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>(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>1.375</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">After passing the midterm exams from the exercises, i.e. after completing all obligations, students can take the oral part of the exam. The oral part of the exam is exempted from students who successfully pass the midterm theory exam during lectures via Merlin e-learning platform.
Students who do not pass the exercises in the midterms take the final written exam, which consists of two parts. The first part includes the theoretical part and solving tasks from stability problems for product tankers, chemicals tankers, crude oil carriers, as well as the verification of work on the simulator for liquid cargo handling. The second part comprises the theoretical part and solving the problems of stability of a ship transporting cargo in a gaseous state. Attendance at lectures and exercises is a condition for taking the exam.
Midterms (parts of the exam) are taken exclusively during attending the class via Merlin e-learning platform, whereas the final (overall) exam is taken within the official examination periods. If the student does not pass all of the exercise midterm tests (but only some of them), working on the liquid cargo simulator (as one unit), i.e. passing the other two exercise midterm tests (as another unit) can be acknowledged.</td></tr>
</table>

In that case, the final written part of the exam can include only the part the student did not pass: working on the handling liquid cargo simulator (first unit) or other exercise (second unit).
The first and second midterm exercise tests can be replaced by appropriate independent assignments, but only during the semester. This does not apply to work on the cargo handling simulator which must be completed.
Acknowledgement of the overall exercise written exam or one of its two parts (the first unit and the second unit) is valid without restrictions until the end of the academic year, that is, until the end of the corresponding deadlines. Parts of the exam are not acknowledged for students who re-enrol the course in the following year. There may be an exception if the student has passed the entire exercise exam; however, no more than a year can pass before taking the oral exam.

Time for writing the overall exam from exercises (written): 3 class hours.
Time for writing one of the two main units of the exam (exercises): 2 hours.
Time for writing the midterm exercise exam (only during class): 2 hours.
Time for writing the midterm theory exam: 2 class hours.

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	10
1st Midterm test (Merlin e-learning platform)	70	30
2nd Midterm test (Merlin e-learning platform)	70	30
Work on the simulator for liquid cargo loading	70	15
Independent assignments	100	10
CBT	70	5

Final evaluation:

(for students who have not met the requirements for continuous assessment)

Indicators of evaluation – final exam	Performance (min.%)	Participation in the final grade (%)
Previous activities (including all indicators of continuous assessment)	100	15
Numeric tasks – written	70	30
Demonstration of simulator work	70	15
Theory exam (written and/or oral)	70	30
Independent assignments	100	5
CBT	70	5

Grading:

(minimum 70% for passing the exam)

Points (%)	Criterion	Grade
0-69	Performance does not meet the minimum criteria	Insufficient - fail (1)
70-79	Performance meets the minimum criteria	Sufficient (2)
80-89	Generally sound work, with a number of notable errors	Good (3)

<table>
<tr><td></td><td>
<table>
<tr><td>90-94</td><td>Performance above the average standard, with some errors</td><td>Very good (4)</td></tr>
<tr><td>95-100</td><td>Outstanding performance</td><td>Excellent (5)</td></tr>
</table>
Assessment and grading 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>Komadina, P.: Tankeri, Faculty of Maritime Studies in Rijeka, 1994.</td><td></td><td></td></tr>
<tr><td>Martinović D., Stanković P.: Sustav inertnog plina, Faculty of Maritime Studies in Rijeka, 1997.</td><td></td><td></td></tr>
<tr><td>IMO: Tanker familiarization, IMO Model Course 1.01, 2000.</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>
1. Martinović, D., Stanković, P.: Pranje tankova sirovom naftom, Faculty of Maritime Studies in Rijeka, 1996.
2. Baptist, C: Tanker Handbook for Deck Officers, Brown, Soon, & Ferguson, LTD Glasgow, 1993.
3. International Chamber of Shipping: International Safety Guide for Oil Tankers & Terminals, Witherby & Co. LTD., London 1996.
4. Group of authors: Prijevoz kemijskim tankerima, Faculty of Maritime Studies in Rijeka, 1997.
5. Group of authors: Prijevoz ukapljenih plinova morem, Faculty of Maritime Studies in Rijeka, 1992.
</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 ENGLISH VI</td></tr>
<tr><td>Code</td><td>PFP164</td><td>Year of study</td><td colspan="5">3</td></tr>
<tr><td>Course teacher</td><td>Tomislav Skračić, MA, senior lecturer</td><td>Credits (ECTS)</td><td colspan="5">2</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>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">Familiarisation with, and the use of, frequent language structures and technical and maritime vocabulary. Development of speaking, listening, reading, understanding, writing and cross-cultural skills with special focus on developing communication skills that marine engineers require in future professional environment.</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. In English language, describe the procedure for starting and reversing the vessel’s main engine.
2. Name basic tasks and responsibilities of the Duty Engineer in the traditional and fully automated / unattended machinery space (UMS).
3. Explain the purpose of keeping the engine log and basic parameters entered there; name the most common malfunctions and most dangerous failures in the main and auxiliary engines.
4. Analyze fire protection on board with the focus on the engine room: causes of fire, detection systems and alarms.,
5. Analyze fire-fighting systems on board: fixed and portable extinguishing devices; types of agents (water, water mist, inert gas, dry powder, dry chemicals, foam) and their application corresponding to the class of fire A, B, C, D, E, F.
6. In English language, provide interpretation and information about the above topics. Create your own CV in EU format and write an Application for a job / scholarship / project participation; develop the skills necessary for life-long learning but also for resuming the studies at graduate level (use of dictionaries, online sources, etc.).</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. Diesel engine operation I – Preparation for starting.
2. Diesel engine operation II – Starting and Reversing the engine.
3. Technical terminology and grammar structures.
4. Keeping watch. Standing orders, routines, duties.
5. Keeping watch. Hand-over, safety and house-keeping checklists.
6. UMS operation.
7. Technical terminology and grammar structures.
8. Engine room log. Keeping a log of all important machinery parameters.
9. Engine room log. Important points to consider while filling out the engine room log book.
10. Engine faults, failures and breakdown.
11. Technical terminology and grammar structures.
12. Fire fighting on board ship I – Detection systems and Fire alarm.
13. Fire fighting on board ship II – Fire Control.
14. Fire fighting on board ship III – Gas, Foam, Dry chemical extinguishing system.</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">15. Review.

Exercises

1. Diesel engine operation I – Preparation for starting. Review of the Passive Voice.
2. Grammar structures: It + be + past participle / adjective + that.
3. Phrasal Verbs. Review of the Passive Voice.
4. Grammar structures: Review of Modal Verbs.
5. Vocabulary study: breakdown, malfunction, trouble, fault, failure, defect, blackout.
6. How to describe graphs and trends in English. Revision of irregular verbs.
7. MIDTERM test 1.
8. Using the Tenses.
9. How to write a CV, Application letter, Letter of motivation.
10. Time clauses 2.
11. Technical terminology and grammar structures.
12. Phrasal verbs. Concession clauses.
13. Review of grammar structures.
14. Written communication.
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
☒ consultations</td></tr>
<tr><td>Student responsibilities</td><td colspan="6">All students are expected to attend lectures and exercises regularly, to be active in class, and to take midterm exams or, alternatively, the final exam. Students apply for examination through the on-line service (“Studomat”).

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. Insufficient attendance may be compensated by performing independent assignments, 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 50% of class attendance cannot take the exam and 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 (lectures + exercises) in order to take the exam and earn ECTS credits. Insufficient attendance may be compensated by performing independent assignments, i.e. additional individual workload. Students whose absence has not been justified (employment, internship, apprenticeship, illness…) cannot take the exam and have to re-register the course in the following academic year.</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>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>1.25</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>
</table>

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

Students can pass the exam by taking **two midterm exams** during the semester. Sample tests are available on Merlin e-learning platform. In the examination period, they can re-take the midterm exam that they missed or failed. If a student has **actively participated in class**, he/she does not have to take the **oral exam**. Students shall take the oral exam in case of insufficient activity in class or if they do not agree with the final grade the teacher has suggested and would like to achieve a higher grade. The **final grade** comprises the class attendance, results of the midterm tests or the final exam, and the activity in class.

Continuous assessment of students

Elements of assessment	Performance (min. %)	Participation in the final grade (%)
Class attendance	80	37.5
Active participation	100	12.5
Midterm I	50	25
Midterm II	50	25

Final assessment

Assessment tools – final exam	Performance (min. %)	Participation in the final grade (%)
Written exam	50	50
Oral exam	50	30-50
Previous activities	80	0-20

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)

The same assessment and grading criteria apply to full-time, part-time and incoming Erasmus+ students.

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

Title	**Number of copies in the library**	**Availability via other media**
Spinčić, A., *An English Textbook For Marine Engineers II*., 4th amended ed., Faculty of Maritime Studies in Rijeka, 2009.	10	Yes
Skračić, T.: PowerPoint presentations available online at Merlin e-learning platform.	-	Yes
Luzer, J., Spinčić, A., *Gramatička vježbenica engleskog jezika za pomorce*, 3rd edition, Faculty of Maritime Studies in Rijeka 2003.	5	Yes

Optional literature (at the time of submission of study

1. Spinčić, A., Luzer, J. *Engleski u brodostrojarskim komunikacijama – English in marine engineering communications*, 3rd amended ed., Adamič, Rijeka 2007.
2. Plančić, Bisera; Skračić, Tomislav: *Englesko-hrvatski pomorski rječnik / English-Croatian Maritime Dictionary*, Faculty of Maritime Studies in Split, 2017.

programme proposal)	3. Selected articles from web-sites, papers and journals on marine engineering and manuals for operation, maintenance and repair of marine engines and machinery.
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)	

3.2. Supplement to the Elaborate Proposal of the Study Programme – Introductory Supplemental Programme

If a student did not attend a marine engineering or similar program at high school, he/she has to take the undergraduate courses comprised in the Introductory supplemental programme, in line with the Ordinance on amendments to the Ordinance on ranks and certification of seafarers (Official Gazette, 45/2014), Article 84, Alinea 2. The ECTS credits earned through the Introductory Supplemental Programme do not make part of the minimum ECTS credits required for completing this university study programme.

The Introductory Supplemental Programme includes the following courses:

<table>
<tr><td colspan="2">NAME OF THE COURSE</td><td colspan="5">MATERIAL PROCESSING TECHNOLOGY AND WELDING PROCEDURES</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>Zdeslav Jurić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="4">2</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>30</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Optional (Introductory supplemental)</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 basics of measurement, SI-units and theoretical basics of measuring essential physical values. Processing of materials. Manual and machine processing. Welding. Methods of welding using pressure, melting, gas techniques. Equipment and devices. Safety and security measures during gas welding. Application and processing of non-metal materials.</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">On completion of the course, the students will be able to:
1. Select proper instruments and perform measurements with the aid of various instruments;
2. Use the tools and devices for processing and welding of materials in a safe way;
3. Select proper tools and perform basic processing of materials either manually or with the help of machines;
4. Properly apply the acquired essential knowledge and skills in various welding techniques.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Predavanja:
1. SI-units and theoretical basics of measuring essential physical values. Familiarisation with the essential measurement and control instruments. Gauges enabling direct reading of values and gauges for indirect measurement and comparison. Fixed and simple gauges, comparators.
2. Classification and features of the measurement devices. Errors in measuring. Examples of relevant measurements in marine engineering: cylinder liner wear,</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">wear of the pistons, piston rings and sealing rings, sagging / hogging of the crankshaft.
3. Manual and machine processing of materials. Geometry of the scraping tools. Forces of cutting. Using heat and cooling in material processing.
4. Consistency and durability of tools. Materials used for manufacturing cutting tools. Quality of the processed surface.
5. Processing techniques: turning, milling, planing, drilling, grinding. Tools and processing modes.
6. Welding. Pressure and melting procedures in welding.
7. Energy sources. Gas flame and electric arc. Gas welding.
8. Welding equipment and devices. Safety and security measures in welding processes.
9. Manual electric arc welding using the coated electrode. Direct and indirect polarity. Electrode coatings.
10. Welding in the protective atmosphere. Procedure of welding metals under protection of inert / active gas using a flux-coated consumable electrode.
11. Procedure of welding metals under protection of inert gas using a non-consumable electrode.
12. Other welding techniques.
13. Welding the stainless steel, gray iron, copper and aluminium.
14. Application and processing of non-metal materials.
15. Sealing materials.
Exercises:
1. SI-units and theoretical basics of measuring essential physical values. Familiarisation with the essential measurement and control instruments. Gauges enabling direct reading of values and gauges for indirect measurement and comparison. Fixed and simple gauges, comparators.
2. Classification and features of the measurement devices. Errors in measuring. Examples of relevant measurements in marine engineering: cylinder liner wear, wear of the pistons, piston rings and sealing rings, sagging / hogging of the crankshaft.
3. Manual and machine processing of materials. Geometry of the scraping tools. Forces of cutting. Using heat and cooling in material processing.
4. Consistency and durability of tools. Materials used for manufacturing cutting tools. Quality of the processed surface.
5. Processing techniques: turning, milling, planing, drilling, grinding. Tools and processing modes.
6. Welding. Pressure and melting procedures in welding.
7. Energy sources. Gas flame and electric arc. Gas welding.
8. Welding equipment and devices. Safety and security measures in welding processes.
9. Manual electric arc welding using the coated electrode. Direct and indirect polarity. Electrode coatings.
10. Welding in the protective atmosphere. Procedure of welding metals under protection of inert / active gas using a flux-coated consumable electrode.
11. Procedure of welding metals under protection of inert gas using a non-consumable electrode.
12. Other welding techniques.
13. Welding the stainless steel, gray iron, copper and aluminium.
14. Application and processing of non-metal materials.
15. Sealing materials.</td></tr>
<tr><td>Format of instruction</td><td>☒ lectures
☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning</td><td>☐ independent assignments
☐ multimedia
☒ laboratory
☐ work with mentor
☐ (other)</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">☐ field work</td><td></td></tr>
<tr><td>Student responsibilities</td><td colspan="7">The students who did not attend a marine engineering or similar program at high school must take this course. Records of student attendance are kept as attending lectures and exercises is compulsory. Students have to attend 95% of lectures and laboratory exercises in order to take the exam. Students with insufficient attendance should compensate for the missed classes, as arranged with the course teacher. The same attendance and assessment criteria apply to both full-time and part-time students (the course is in compliance with the STCW Convention).</td></tr>
<tr><td rowspan="5">Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</td><td>Class attendance</td><td>1.5</td><td>Research</td><td></td><td>Practical training</td><td>0.25</td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Final exam</td><td>0.25</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td>(Other)</td><td></td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="6">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>95-100</td><td>75</td></tr>
<tr><td>Practical work</td><td>100</td><td>12.5</td></tr>
<tr><td>Final test</td><td>50</td><td>12.5</td></tr>
</table>
In order to complete the course successfully, a student has to achieve at least 50% of points to pass the exam.
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>
Assessment and grading 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="4">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td></td><td colspan="4">N. Mišina: Tehnologija materijala, internal script, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split</td><td></td><td></td></tr>
<tr><td></td><td colspan="4">Deželić R.: Osnove konstrukcijskih materijala, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, 1996.</td><td></td><td></td></tr>
</table>

Optional literature (at the time of submission of study programme proposal)	Šestan: *Tehnologija materijala i obrade*, Faculty of Maritime Studies in Rijeka, 1997.		
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">BASIC SAFETY AND FIRST AID</td></tr>
<tr><td>Code</td><td>PFS001</td><td>Year of study</td><td colspan="5">1</td></tr>
<tr><td>Course teacher</td><td>Zlatko Kjajić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">2</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2">Stipe Galić, 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>45</td><td>0</td><td>25</td><td>5</td></tr>
<tr><td>Status of the course</td><td>Optional (Introductory supplemental)</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">o Master basic principles of survival. Recognise potential risks, assess critical conditions and be able to take adequate measures in protecting human life in emergencies and sea accidents. Determine priorities in onboard fire-fighting and most beneficial actions depending on current circumstances. Pay particular attention to personal safety and social responsibility, and consistently correct errors in the organisation of these systems.
o Master the methods of providing first aid. Avoid doing harm when giving first aid. Check and safeguard the accident location. Perform an orientation check of the injured or sick person and make preliminary diagnosis. Apply urgent procedures in providing first aid. Be sure when to carry out reanimation. Define care management if there are more than one injured persons.</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. Assess current conditions and select the most beneficial means of rescuing and survival of persons at risk.
2. Examine the possibilities and thoroughly plan rescue procedures.
3. Timely detect potential fire risk, adequately arrange fire-fighting equipment and human resources, and handle difficulties using the methods that ensure minimum harm or damage.
4. Adjust all onboard operations to the minimum abilities of crew members and passengers for their own safety's sake, and adjust the level of social responsibility to the feasible practice.
5. Timely detect potential adverse phenomena, study the causes and select the most appropriate ways of eliminating them.
6. Evaluate the health condition of the injured or sick person. Identify the types of injuries and health issues.
7. Save life by giving first aid if this is possible.
8. Prevent permanent consequences (injuries, disability, death).
9. By applying appropriate procedures, shorten the length of treatment and rehabilitation.
10. Apply basic medical and first-aid tools on board vessels.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures:
1. Personal survival and safety, survival principles. Potential threats.
2. Abandoning ship. Personal survival equipment (life-jackets, horse-shoe, hydro- and thermo-protective suits). Survival at sea.
3. Survival vessels.
4. Helicopter rescue and communication in distress.
5. Fire-fighting principles, theory of burning and burning conditions.
6. Prevention of fires.</td></tr>
</table>

	7. Detection of fires. 8. Onboard fixed fire-fighting systems. 9. Fire-fighting agents. 10. Onboard fire-fighting equipment: hoses, nozzles, portable extinguishers, detectors, alert communications, general fire alarm. 11. Ways of extinguishing fires. 12. Safe work onboard vessels and interpersonal relationships. 13. Understanding and acknowledging the orders and ability to understand the assigned duties. 14. Emergency procedures. Precaution measures for preventing pollution of the sea and marine environment. 15. Human relations on board. **Exercises:** 1. Abandoning ship. 2. Essential survival equipment. 3. Essential survival equipment. 4. Essential survival equipment. 5. Essential survival equipment. 6. Communication equipment in distress. 7. Communication in distress. Communication with the rescue helicopter or plane. 8. Using fire-fighting appliances. 9. Extinguishing smaller fires. 10. Extinguishing larger fires. 11. Fire-fighting in smoke-filled spaces. 12. Fire-fighting in smoke-filled spaces. 13. Human relations on board. 14. Understanding and acknowledging the orders. Emergency procedures. 15. Precaution measures for preventing pollution of the sea and marine environment. **Lectures:** 1. Essential principles of rendering first aid on board vessel. Significance and obligation to provide first aid on board. 2. Difference in procedures and attitudes between first aid and care procedures at sea and on shore. 3. First aid equipment. 4. Conditions that require urgent intervention (arrest of respiration and heart failure, severe bleeding, shock and unconsciousness). 5. Control of vital functions. Checking the blood pressure, pulse and breathing. 6. Ascertaining vital functions – ABC rule. The signs of death, early and late signs of death, apparent death. 7. Reanimation principles. 8. Types and causes of shock, rendering first aid. External heart massage. 9. Resuscitation methods. 10. Types of bleeding. Familiarisation with the means for stopping bleeding. 11. Fractures, dislocations and sprains. Types and symptoms. First aid procedure, immobilisation. 12. Burns and first aid procedure. 13. Poisoning and first aid procedure. 14. Eye injuries and first aid procedure. 15. Hypothermia and heat shock. Types of wounds. Rendering first aid. **Exercises:** 1. Demonstration of the first aid equipment and providing first aid on board. 2. Establishing the state of the casualty and setting a “diagnosis”. 3. External heart massage. 4. Resuscitation. 5. First aid in the event of suffocation. Demonstration of resuscitation methods.

<table>
<tr><td></td><td colspan="6">6. Establishing the position for the pulse control.
7. Familiarisation with a resuscitation mask and an oxygen appliance.
8. Familiarisation with the equipment for stopping external bleeding. Establishing the position for the digital compression as a method of stopping bleeding.
9. Immobilisation in the event of limb fractures. Immobilisation when a spine injury is suspected.
10. Treating the open and closed burns.
11. Disinfection agents for treating the skin and periphery of wounds.
12. Eye flushing.
13. Simulation of first aid in the event of poisoning.
14. Simulation of first aid in the event of hypothermia.
15. Preparing a casualty for transportation.</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 95% of class attendance in lectures and 100% in exercises (auditory and on training ground) 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 can pass the exam by taking two midterm tests during the semester. Students who have fulfilled course obligations but have missed or failed the midterm exams, shall take the complete final exam in the examination period. The student who has passed 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 exam in case they would like to achieve a higher grade. Absenteeism cannot be justified by written documents. Students with less than 20% of absence, caused by illness or other justified reason, will be able to compensate for the missed classes during supplementary classes during or after the semester, but not later than one month after the completion of regular classes.

Obligations of part-time students:
The same criteria 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>1.875</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>(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>0.125</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">Obtaining the B2 certificate – Basic safety (STCW A-VI/1) requires 95% attendance in lectures and 100% in exercise classes.

Obtaining the D19 cerificate – Medical first aid (STCW VI/4-1) requires 95% attendance in lectures and 100% in exercise classes.

Students take two written midterm tests. The first test comprises Lectures 1-6 and is held in the 7th week of the semester, while the second comprises Lectures 7-14 and takes place in the 15th week of the semester. Sample tests and exam questions</td></tr>
</table>

<table>
<tr><td></td><td>
are available at Merlin e-learning platform and at the end of each lecture class. A student has to achieve at least 60% of points to pass a midterm test. In case a student passes both tests, he/she does not have to take the final exam. If a student has missed / failed one of the midterms for justified reasons, he/she can re-take that test in the 7th/15th week of the semester.

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>95</td><td>7.5</td></tr>
<tr><td>Seminar paper</td><td>100</td><td>2.5</td></tr>
<tr><td>Midterm test I</td><td>60</td><td>45</td></tr>
<tr><td>Midterm test II</td><td>60</td><td>45</td></tr>
</table>
Grading:

The standard final grade does not exist in the course Basic safety and first aid. It is considered that the course is passed upon passing all midterm/final exams and completing all obligations. The same criteria apply both to the continuous assessment and the final exam, for full-time and part-time students alike.
</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>Zec. D.: Sigurnost na moru, Faculty of Maritime Studies in Rijeka, 2001.</td><td>10</td><td>Yes</td></tr>
<tr><td>R. Mulić, D. Ropac: Medicina za pomorce, Medicinska naklada, Zagreb, 2003.</td><td></td><td></td></tr>
<tr><td>WHO: International Medical Guide for Ships, 3rd edition. WHO, Geneva, 2007.</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>/</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">SHIP PLANTS AND SYSTEMS</td></tr>
<tr><td>Code</td><td>E-URP</td><td>Year of study</td><td colspan="4">2</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="4">2</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>30</td><td></td></tr>
<tr><td>Status of the course</td><td>Optional (Introductory supplemental)</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">Familiarise the students with the essential marine engineering matter so that they can complete the undergraduate marine engineering program in line with the IMO Model Course 7.04.</td></tr>
<tr><td>Course enrolment requirements and entry competences required for the course</td><td colspan="6">This course has been designed for the students who did not attend a marine engineering or similar program at high school.</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 module, the students will be able to:
1. Recognise and describe various circular processes going on in various ship's plants.
2. Recognise and describe the principle of operation of the marine two-stroke and four-stroke diesel engines, and to define and describe the functions of the essential systems that, directly or indirectly, facilitate the operation of the main propulsion engine.
3. Define and analyse the functions of the pipelines and their components.
4. Describe the functions and designs of common onboard systems and the fresh water generation system.
5. Recognise the types, principles of operation and designs of the ship’s auxiliary engines and devices.
6. Integrate the essential insights into marine engineering so as to understand the ship’s technical documents.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Lectures and exercises:
1. Types of the ship's plants. Ship's pipelines and their elements. Types of valves and cocks.
2. Circular processes. Internal combustion engines.
3. Fuels and lubricating oils. Combustion. Creation of combustible mixture in a diesel engine. Preparation of fuel.
4. Types of marine engines. Operating cycle of a diesel engine. Slow-speed two-stroke engines. Four-stroke engines. Engine elements.
5. Engine systems: lubricating oil, starting air, fuel, cooling. Operating an engine.
6. Auxiliary boilers. Operation. Heat exchangers.
7. Evaporators and desalination equipment. Bilge system. Ballast system.
8. Airs compressors. Reciprocating compressors. Screw compressors.
9. Steering gear. Steering in an emergency. Hydraulic systems.
10. Procedures for waste and sewage management.
11. Cooling equipment. Air-conditioning on board ship.
12. Mooring winches and windlasses. Deck cranes and derricks.
13. Types of marine pumps.
14. Shafting and shaft sealing.
15. Introduction to the ship's technical documents.</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="6">☐ seminars and workshops
☒ exercises
☐ on line in entirety
☐ partial e-learning
☒ field work</td><td colspan="6">☐ multimedia
☐ laboratory
☐ work with mentor
☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="12">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 100% in exercises. It is compulsory to perform field work. The students who have not fulfilled the course obligations have to re-register the course in the following academic year.
Obligations of part-time students:
Part-time students are required at least 80% of class attendance in lectures and 100% in exercises. Other obligations are equal to those of 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>1.5</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>Field work</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>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="12">Records of student active participation in class are kept. In order to complete the course successfully, students have to:
• Meet minimum attendance requirements, and
• Earn at least 50% of points on the final exam.
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>Class attendance</td><td>90</td><td>75</td></tr><tr><td>Field work</td><td>100</td><td>25</td></tr></table>The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="6">Required literature (available in the library and via other media)</td><td colspan="8">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="8">V. Ozretić, Brodski pomoćni strojevi i uređaji, SSM-Split, Split 1996</td><td></td><td></td></tr>
<tr><td colspan="8">A. Pažanin, Brodski motori, Palga d.o.o., Split, 1998.</td><td></td><td></td></tr>
<tr><td colspan="8">D. Martinović, Strojarski priručnik za časnike palube, Faculty of Maritime Studies in Rijeka, 2000.</td><td></td><td></td></tr>
<tr><td colspan="8"></td><td></td><td></td></tr>
<tr><td colspan="8"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="12">1. H. D. McGeorge: Marine Auxiliary Machinery seventh edition, Butteworth Heinemann, London, 1995.
2. S. Šneller: Pogon broda I, FSB, University of Rijeka, 1996.
3. S. Šneller, Ž. Oarat: Pogon broda II, FSB, University of Zagreb, 1996.
4. Z. Prelec: Brodski generatori pare, Školska knjiga Zagreb, 1996.</td></tr>
</table>

	5. E. Tireli, D. Martinović: *Brodske toplinske turbine*, Faculty of Maritime Studies in Rijeka, 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><th colspan="2">NAME OF THE COURSE</th><th colspan="6">ONBOARD TRAINING AND ENGINE-ROOM PRACTICE</th></tr>
<tr><td>Code</td><td>PFS002</td><td>Year of study</td><td colspan="5">2</td></tr>
<tr><td>Course teacher</td><td>Branko Lalić, PhD, assistant professor</td><td>Credits (ECTS)</td><td colspan="5">2</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>60</td><td>0</td></tr>
<tr><td>Status of the course</td><td>Optional (Introductory supplemental)</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">Familiarise the students with the crew's routine tasks on board, in accordance with STCW and SOLAS conventions.</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">Upon successful completion of the course, the students will have general knowledge and master basic methods, techniques, and skills that are necessary for handling marine engine systems, main engines, auxiliary engines and generators, boilers, separators, compressors, steering gear and other machinery onboard vessels at management level, in accordance with the requirements of STCW.</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="6">Exercises:
1. Introduction to the duties in the event of fire and abandoning ship. Familiarisation with the fire-fighting systems. Procedure for extinguishing an engine room fire using CO_2. Operation of the fire pump. Handling the breathing apparatus and personal fire protective gear.
2. Introduction to the ship construction.
3. Engine room watch: duties, hand-over, keeping the Engine Log.
4. Bilge system and bilge separator. Keeping the Oil Record Book. Waste water system and waste water treatment.
5. Familiarisation with the systems of potable, fresh and sea water. Structural tanks and level measurements.
6. Compressed air system.
7. Fuel bunkering procedure and fuel system.
8. Operation of the hydraulic systems; steering gear.
9. Deck gear: cranes, mooring winches and windlass.
10. Preparation for starting the main engine. Systems within the main engine: sea water cooling, fresh water cooling, oil and fuel systems. Maintenance. Local control of the main engine. Monitoring and control of the main engine operation.
11. Familiarisation with the main switchboard. Distribution of the 380 V, 220 V and 24 V power. Charging and maintenance of batteries. Engine room alarm system.
12. Preparation for starting diesel generators. Parallel operation of the generators. Monitoring and control. Supplying power to the main switchboard from the shore-based source.
13. Oil-fired boilers and exhaust gas boilers.
14. Cooling of the provisions.
15. Ventilation and air-conditioning.</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</td></tr>
</table>

<table>
<tr><td></td><td colspan="6">☒ field work</td><td colspan="2">☐ (other)</td></tr>
<tr><td>Student responsibilities</td><td colspan="8">Students are obliged to attend at least 90% of the exercises and participate in the field work (100% attendance).</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 colspan="2"></td></tr>
<tr><td>Experimental work</td><td></td><td>Report</td><td></td><td>Field work</td><td colspan="2">0.5</td></tr>
<tr><td>Essay</td><td></td><td>Seminar essay</td><td></td><td colspan="3">(Other)</td></tr>
<tr><td>Tests</td><td></td><td>Oral exam</td><td></td><td colspan="3">(Other)</td></tr>
<tr><td>Written exam</td><td></td><td>Project</td><td></td><td colspan="3">(Other)</td></tr>
<tr><td>Grading and evaluating student work in class and at the final exam</td><td colspan="8">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>90</td><td>75</td></tr><tr><td>Field work</td><td>100</td><td>25</td></tr></table>The same grading and evaluation criteria apply to both full-time and part-time students.</td></tr>
<tr><td rowspan="4">Required literature (available in the library and via other media)</td><td colspan="6">Title</td><td>Number of copies in the library</td><td>Availability via other media</td></tr>
<tr><td colspan="6">Teaching materials and notes from classes.</td><td></td><td></td></tr>
<tr><td colspan="6"></td><td></td><td></td></tr>
<tr><td colspan="6"></td><td></td><td></td></tr>
<tr><td>Optional literature (at the time of submission of study programme proposal)</td><td colspan="8">n/a</td></tr>
<tr><td>Quality assurance methods that ensure the acquisition of exit competences</td><td colspan="8">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="8"></td></tr>
</table>