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3.2. Course Description

Generic information		
Head of Course	Igor Vio, PhD	
Course	Maritime Law	
Study Programme	Marine Engineering	
Level	Undergraduate degree programme	
Type of Course	Core (compulsory course)	
Year of Study	1	
Estimated Student Workload and Methods of Instruction	ECTS Coefficient of Student Workload	3
	Number of Hours (L+E+S)	30 + 0 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Students should become familiar with international and national legal framework regulating the boundaries of national jurisdiction at sea, rights and duties of states at sea, their mutual relations related to exploration and exploitation of marine and submarine resources and their protection, their relations concerning war and neutrality in armed conflicts at sea, as well as safety of navigation and protection of the marine environment, organization of maritime administration, labour relations of seafarers, flag state and port state control, maintenance of order in ports and harbours, and regime of maritime domain. Students should also gain knowledge on international and national legal regulations governing maritime accidents such as general average, collisions of ships, salvage at sea, wreck removal and liability for marine pollution, along with basic concepts of marine insurance.

1.2. Prerequisites for Course Registration

none

1.3. Expected Learning Outcomes

After passing the exam, the students will be able:

1. To list and compare the international conventions and other sources of the international law of the sea, to describe its basic principles and to explain their influence on the regimes of navigation of ships in various parts of the sea, as well as on the regime of the exploitation of the resources of the sea and the seabed.

2. To explain the regime of entry and navigation of various foreign ships (merchant, government, military, fishing, scientific) and foreign yachts and boats in internal waters, territorial sea and protected ecological and fishery zone of the Republic of Croatia.

3. To enumerate and interpret rules and regulations of international maritime law governing the safety of navigation and the protection of the marine environment.

4. To explain the structure and describe the activities of the International Maritime Organization (IMO) and the European Maritime Safety Agency (EMSA).

5. To list the laws and regulations of the Republic of Croatia in the area of maritime administrative law and explain their application to ships and other maritime crafts, maritime navigation, sea lanes, pilotage and order in seaports.

6. To describe organization of the maritime administration in the Republic of Croatia, explain the role and organization of harbour master's offices, to enumerate their functions, highlight the features of the

certificate of registration and other ship documents and books, indicate the principles and procedures of inspection, explain the technical control and list other activities of the Croatian Register of Shipping.

7. To explicate the legal regulation of the maritime domain and seaports in the Republic of Croatia, describe the concept of the maritime domain and highlight the features of its concession, interpret the notion and list the types of seaports, and to describe the structure of the port authority and indicate its activities.

8. To compare and describe the specifics of the legal position of master, chief engineer and crewmembers, to analyse and interpret their rights and obligations under international and national maritime labour law.

9. To explain and interpret the basic features of the maritime law concepts of general and particular average, ship collisions, salvage at sea and wreck removal, as well as indicate the principles of shipowner's liability for pollution of the marine environment and to specify the main elements of marine insurance.

1.4. Course Outline

International Law of the Sea: definition and codification: UNCLOS I, II and III - Geneva Conventions (1958) and UN Convention on the Law of the Sea (1982); internal waters, ports, bays, historic bays and historic waters, archipelagic waters, regime of islands, territorial sea, contiguous zone, straits used for international navigation, canals, continental shelf, exclusive economic zone, maritime boundary delimitation, area, high seas, land-locked states, geographically disadvantaged states, enclosed and semi-enclosed seas, marine scientific research, marine pollution, marine and submarine areas of the Republic of Croatia, status of foreign ships in Croatian internal waters and territorial sea; International Law of Armed Conflicts at Sea: neutrality, rights and duties of neutral and belligerent states, war zones at sea, status of neutral ships in convoy, status of military and merchant ships in armed conflicts, naval blockade, contraband of war.
International Maritime Organization (IMO) – structure, goals and functions. International conventions on safety of navigation and protection of the marine environment: SOLAS, COLREG, LOADLINES, TONNAGE, INTERVENTION, LDC, MARPOL, OPRC, AFS and BWC. Principles of ISM and ISPS Code, Paris Memorandum of Understanding on Port State Control, problems of flags of convenience. European Maritime Safety Agency (EMSA) - structure and functions. Master and crew, STCW Convention, Maritime Labour Convention and other Conventions and Resolutions of the International Labour Organization (ILO). Croatian maritime legislation, Maritime Code, harbour master's offices and inspection of safety of navigation, categories of navigation, sea lanes, pilotage, ships – legal regime, ownership, nationality, registration, classification, name and call sign, ship registers, ship's documents, log book. Croatian Register of Shipping, technical supervision of ships, jurisdiction – flag state, coastal state and port state jurisdiction. Maritime Domain and Seaports Act: concept of maritime domain, concessions, definitions and characteristics of ports and harbours, concessions for port activities, port fees. Maritime accidents: concept of particular and general average, collision of ships, salvage at sea, wreck removal, marine pollution from ships and liability, marine insurance basics - hull, cargo and liability insurance through P&I Clubs.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☐ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments	

1.7. Student Obligations

a) Students' main obligations are active course attendance with the preparation and presentation of seminar paper and they are required to pass two mid-term tests.

b) As a prerequisite for the final exam, students must score at least 35 out of a possible 70 points (50%) during the classes.

c) Students must score at least 15 out of a possible 30 points on final exams (50%).

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,0	Class participation		Seminar paper	0,2	Experiment	
Written exam	1,0	Oral exam		Essay		Research	
Project		Continuous Assessment	0,8	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The evaluation procedure consists of continuous examination of knowledge in the form of two tests and a final exam. Examples of evaluating learning outcomes during classes and on the final exam:

1. Compare the concept and legal regime of the contiguous zone according to the Convention on the Territorial Sea and Contiguous Zone (1958) and the UN Convention on the Law of the Sea (1982).
2. Indicate and explain conditions for entry and navigation of ships, yachts and boats of foreign nationality in internal waters of the Republic of Croatia, including their stay in seaports and shipyards.
3. List and discuss international acts regulating the protection of the marine environment from pollution.
4. Describe the structure of the International Maritime Organization (IMO) and highlight the role and functions of each body (Assembly, Council, Secretariat, Committees and Subcommittees).
5. Interpret the term and types of pilotage according to the provisions of the Maritime Code of the Republic of Croatia, specify the rights and duties of the pilot, and explain potential responsibility and liability of the pilot and of the pilot company.
6. Describe the structure of the maritime administration in the Republic of Croatia, highlight the most important powers of harbour master's office, and elaborate the rules of procedure for maritime offenses.
7. Explain the legal concept of maritime domain and indicate which parts of land and sea have this status.
8. Specify the most important legislative acts regulating the rights and obligations of seafarers, describe the organization of watchkeeping in engine and explain the role and duties of the chief engineer.
9. Compare the legal concepts of particular and general average, and explain under what conditions damage of the main engine may be recognized as general average.

1.10. Main Reading

Luttenberger, Axel, Pomorsko upravno pravo, Pomorski fakultet, Rijeka, 2005.
Luttenberger, Axel, Osnove međunarodnog prava mora, Pomorski fakultet, Rijeka, 2006.
Luttenberger, Axel, Pomorsko ratno pravo, Pomorski fakultet, Rijeka, 2008.
Pavić, Drago, Pomorsko pravo, knjiga III – Pomorske nezgode i pomorsko osiguranje, VPŠ, Split, 2000.

1.11. Recommended Reading

Capar, Rudolf, Međunarodno pravo mora, Pomorski fakultet, Rijeka, 1994.
Capar, Rudolf, Međunarodno pomorsko ratno pravo, Školska knjiga, Zagreb, 1989.
Grabovac, Ivo, Pomorsko pravo, Knjiga I: Pomorsko javno i upravno pravo,VPŠ Split, 2001
Grabovac, Ivo – Petrinović, Ranka, Pomorsko javno, upravno i radno pravo, Pomorski fakultet, Split, 2006.
Pavić, Drago, Pomorsko imovinsko pravo, Književni krug, Split, 2006.
Stanković, Predrag, Pomorske havarije, Školska knjiga, Zagreb, 1995.
Ibler, Vladimir, Međunarodno pravo mora i Hrvatska, Barbat, Zagreb, 2001.
Rudolf, Davorin, Međunarodno pravo mora, JAZU, Zagreb, 1985.
Pomorski zakonik, N.N. 181/04. (s kasnijim izmjenama i dopunama)

[1] **NOTE:** 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. Use empty fields for additional activities.

Zakon o pomorskom dobru i morskim lukama, N.N. 158/03. (s kasnijim izmjenama i dopunama)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Osnove međunarodnog prava mora	Sufficient (in library and book shop)	148
Pomorsko ratno pravo	Sufficient (in library and book shop)	148
Pomorsko upravno pravo	Sufficient (in library and book shop)	148
Pomorsko pravo, knjiga III – Pomorske nezgode	Sufficient (in library and book shop)	148

1.13. Quality Assurance

Quality assurance of the course performance is continuously monitored according to ISO 9001 system applied at the University of Rijeka Faculty of Maritime Studies. An analysis of results of the final exams and a student survey are conducted and appropriate measures are adopted for each academic year.

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Course description

Generic information			
Head of Course	Jana Kegalj, PhD		
Course	English Language I		
Study Programme	Marine Engineering		
Type of Course	Core		
Year of Study	1	Semester	1
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		15+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to develop the students' ability for written and oral communication in English language using the basic terminology related to the types, parts and dimensions of ships, as well as deck machinery and crew members.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

The students are expected to be able to:

1. Demonstrate language skills for describing the types of ships.
2. Demonstrate language skills for describing ship parts and deck machinery.
3. Use specialized terminology to describe the duties of individual crew members.
4. Describe everyday activities and retell past events.
5. Paraphrase active sentences into passive.
6. Translate simple sentences from Croatian into English, using a dictionary.

1.4. Course Outline

Types of ships, Ship's construction, spaces, measurements, Mathematic symbols and formulae, Manning, Duties and responsibilities, Employment contract and the necessary documentation, Sentence structure, tenses, passive voice.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Class attendance, activities, continuous assessment and final exam (written and oral)

1.8. Assessment[1] of Learning Outcomes

[1] **NOTE:** 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. Use empty fields for additional activities.

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio		Final exam	1				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70 % in class, 30 % at the final exam (outcomes 1-6).
1st mid-term exam (30 %) for outcomes 1, 2, 4
2nd mid-term exam (30 %) for outcomes 3,5,6
Activity in class (doing exercises in the learning platform Merlin) (10 %)
Final oral exam (30 %) (outcomes 1-6)

Examples of assessment for each outcome in mid-term exams:
1. Recognize the type of ship on the picture and describe her basic characteristics using proper terminology in English.
2. Mark parts of ships on the picture and name the deck machinery shown in the picture
3. Using specialized terminology to talk about duties of individual crew members.
4. Describe everyday activities on the ship. Retell a past even in pairs.
5. Rephrase active sentences into passive.
6. Understand and translate simple professional texts from Croatian into English using a dictionary.

Examples of assessment for each outcome in the final exam:
1. Provide an oral description of the ship in the picture.
2. Define what is and where is a superstructure, engine room, chain locker, etc, how the winch works.
3. Describe the duties of certain crew members, say something about the documents and contracts that the seamen sign.
Outcomes 4 and 5 are not assessed directly, but in the framework of other outcomes (eg. understanding and usage of the present tense may be assessed through the task of ship description (outcome 1) whereby the student has to use the appropriate tense).
6. Provide an oral translation of a professional text from Croatian into English using a dictionary.

1.1. Main Reading

1. Spinčić, A.-Pritchard, B.: *An English Textbook for Marine Engineers I,* Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.
2. Luzer, J. Spinčić. A*: Gramatička vježbenica engleskog jezika,* Pomorski fakultet, III izdanje, Rijeka 2003.

1.2. Recommended Reading

MarEng, Web-based Maritime English Learning Tool, EU Leonardo Project
Kluijven, P. van , *International Maritime English Programme*. Alkmaar
moodle.srce.hr

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Spinčić, A.-Pritchard, B. *An English Textbook for Marine Engineers* Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.	70	70
Luzer, J. Spinčić. A: *Gramatička vježbenica engleskog jezika*, Pomorski fakultet, III izdanje, Rijeka 2003.	70	70

1.4. Quality Assurance

The quality of the course is monitored in accordance with the ISO 9001 system and the European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the course are analyzed and appropriate measures implemented accordingly.

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3.2. Course description

Generic information			
Head of Course	Dr. Sc. Biserka Draščić Ban, Ivan Tudor, mag.educ.		
Course	Mathematics 1		
Study Programme	Marine Engineering		
Type of Course	Mandatory		
Year of Study	1st year		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of Mathematics 1 is to enable students to acquire fundamental mathematical knowledge and skills necessary for understanding and solving problems in the maritime profession and related technical disciplines. Special emphasis is placed on the application of differential calculus, sequence theory, functions, vectors, and matrices, thus developing analytical abilities and laying the foundation for further professional education. Through practical examples, students will connect mathematical methods with challenges in the maritime sector.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

Upon completion of the course, students will be able to:

1. Apply Peano's axioms and mathematical induction to prove basic mathematical statements and compute expressions involving complex numbers in algebraic and trigonometric form.
2. Solve combinatorics problems using permutations, combinations, variations, Newton’s binomial theorem, and Pascal’s triangle.
3. Use matrices and determinants to solve systems of linear equations, including Gaussian elimination and Cramer’s rule, and calculate inverse matrices.
4. Describe basic vector concepts, including scalar, vector, and mixed products, and apply vectors in coordinate system analysis.
5. Analyze convergent and divergent sequences, calculate sequence and function limits, and verify function continuity.
6. Apply basic rules of differential calculus to solve practical problems and differentiate functions, including implicitly and parametrically defined functions and composite functions.

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1.4. Course Outline

Number sets, mathematical induction, basics of combinatorics, complex numbers, determinants, matrices, systems of linear algebraic equations, vectors, sequences, functions of a single real variable, limits of functions, properties of limits, tabulated limits, derivatives and their properties, differential, theorems of differential calculus, applications of derivatives.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Students are required to actively attend lectures and exercises. All continuous assessments and tests influence the final grade.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

During the course, two knowledge checks are conducted, evaluating 60% of the learning outcomes:

- 1st test: 30% (learning outcomes 1–4)
- 2nd test: 30% (learning outcomes 5–6)

Two additional tests evaluate 10% of the outcomes:

- 1st test: 5% (outcome 3)
- 2nd test: 5% (outcome 5)

The final exam covers the remaining 30% (theoretical part; outcomes 1, 4, 5, and 6).

Examples:

1. Calculate z if: $z = (1 + \frac{1-i}{1+i})^{22}$ (Outcome 1)
2. How many different ways are there to choose 3 people from a group of 10? (Outcome 2)
3. Solve the system using Cramer's rule:
   x + 2y − z = 3
   2x − y + z = 0
   3x + y + 2z = 12 (Outcome 3)
4. For vectors a=(1,2,3), b=(4,5,6), c=(7,8,9), calculate their scalar and vector products. (Outcome 4)
5. Calculate the limit: $\lim_{x \to 0} \frac{e^x - 1}{\sin 2x}$ (Outcome 5)
6. Differentiate the given function: f(x)=sin(5x)+cos(2x) (Outcome 6)

1.10. Main Reading

- Learning materials on the e-learning platform – Merlin (https://moodle.srce.hr)

- R. Dobrosavljević, Ž. Glavan, I. Kitarović, Z. Zenzerović, *Matematika I*, Maritime Faculty, Rijeka, 1982

- B. P. Demidovič, *Problems and Solved Examples in Mathematical Analysis*, Tehnička knjiga, Zagreb, 2003

1.11. Recommended Reading

- P. Miličić, M. Uščumlić, *Collection of Advanced Mathematics Problems 2*, Naučna knjiga, Belgrade, 1971.

- S. Kurepa, *Mathematical Analysis, Part Two: Functions of One Variable*, Tehnička knjiga, Zagreb, 1971.

- D. Blanuša, *Higher Mathematics, Part I*, Tehnička knjiga, Zagreb, 1963.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
R. Dobrosavljević et al., *Matematika I*	8	60
B. P. Demidovič, *Problems and Solved Examples in Mathematical Analysis*	8	60

1.13. Quality Assurance

Study quality is monitored according to the ISO 9001 system and in alignment with European standards and guidelines for quality assurance, as implemented by the Maritime Faculty in Rijeka. Pass rates are analyzed annually and appropriate measures are taken.

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3.2. Course description

Generic information		
Head of Course	Marko Gulić, PhD	
Course	Applied Computer Science	
Study Programme	Marine Engineering	
Type of Course	Compulsory	
Year of Study	1st	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

To acquire knowledge about the structure and operating principles of computers as well as skills in using computers for word processing and spreadsheet applications. To train students to solve problems using computers by developing algorithms and implementing them using programming packages.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

After attending and passing the course, students will be able to:

1. Identify the basic components of digital computers and their functions, including input/output units, working memory, hardware, and CPU.
2. Describe the operation of digital computers using number systems, logical expressions, and mathematical-logical fundamentals.
3. Apply basic principles of algorithms for problem-solving, including defining control structures (sequence, branching, looping).
4. Demonstrate the use of the MS Windows operating system for file management, data retrieval, and file compression.
5. Customize text documents in MS Word by formatting characters, paragraphs, headers, and tables, and prepare documents for printing.
6. Analyse data in MS Excel using formulas, functions (IF, COUNTIF), conditional formatting, and charts.
7. Develop basic computer programs using Just Basic, implementing conditional structures and loops.
8. Compare different types of computer software and evaluate their use in real-world scenarios.

1.4. Course Outline

Mathematical-logical foundations of computer operations. Problem-solving using computers. Algorithms and programs (Just Basic). Elements of algorithms. Description of algorithms. Algorithm commands. Algorithm control structures. Computer hardware. Input/output devices. Memory. Processor. Computer software. System software. Operating system (MS Windows). Programming software. Utility programs. Application software. Word processing software (MS Word). Spreadsheet software (MS Excel).

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Students are required to actively attend lectures and exercises. All continuous assessments contribute to the final grade, none of which can be passed with less than 50% of the grading points.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Three knowledge tests are conducted during classes using computers, covering 70% of learning outcomes:

- Just Basic programming: 20% (Outcomes 2, 3, 7)
- MS Word: 25% (Outcomes 4, 5)
- MS Excel: 25% (Outcome 6)

The remaining 30% is assessed in the final exam (theory – Outcomes 1 and 8).

Examples of evaluating learning outcomes respecting set learning outcomes are:

1. List technologies used for data recording in storage memory (Outcome 1).
2. Convert number 756 from octal to hexadecimal (Outcome 2).
3. Define algorithm steps that check whether a student meets exam requirements (Outcome 3).
4. Compress all newly created documents into one and create a file named nameSurname.zip (Outcome 4).
5. Format text using MS Word according to given specifications (Outcome 5).
6. Create a chart in MS Excel based on provided data (Outcome 6).
7. Write a Just Basic program that reads 20 numbers and prints the largest (Outcome 7).
8. Describe various types of application software (Outcome 8).

1.10. Main Reading

- Tudor, M. Primjena elektroničkih računala, Sveučilište u Rijeci, Pomorski fakultet u Rijeci, Rijeka, 2010.
- Course materials are available on the e-learning platform Merlin (https://moodle.srce.hr)

1.11. Recommended Reading

- Vukšić et al., Osnove poslovne informatike, University of Zagreb, Faculty of Economics, 2020.

[1] NOTE: 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. Use empty fields for additional activities.

• Grundler et al., ECDL 5.0 (WINDOWS 7, OFFICE 2010): osnovni program - 7 modula, PRO-MIL, Varaždin, 2012.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Tudor, M. Primjena elektroničkih računala, Sveučilište u Rijeci, Pomorski fakultet u Rijeci, Rijeka, 2010.	Library: 10 copies Script Office: 150 copies	50
E-course teaching materials available on the Merlin e-learning system	unlimited	50

1.13. Quality Assurance

The quality of studies is continuously monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. At the end of each semester, an anonymous evaluation of the quality of instruction is conducted by the students. Additionally, an annual analysis of student success in the course is performed (the percentage of students who passed the course and their average grades).

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3.2. Course description

Generic information			
Head of Course	Prof. Goran Vukelić, PhD.		
Course	Engineering Mechanics 1		
Study Programme	Marine Engineering		
Type of Course	Compulsory		
Year of Study	1		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		45+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquiring theoretical knowledge that is the basis for problem solving in the field of solid mechanics statics.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

After passing the exam, the student will be able to:
1. Describe the axioms of statics and laws of mechanics.
2. Apply the laws of mechanics to solve the problems of determining the reactions of rigid bodies on friction(less) surfaces.
3. Analyze the load distribution of beams and trusses.
4. Describe the simple and combined types of loads and deformations.
5. Apply the laws of mechanics to the dimensioning of the solid body.
6. Analyze stress, strain and stability of beams.

1.4. Course Outline

Introduction to mechanics with basic mathematics for problem solving in mechanics. Colinear, concurrent, parallel and general planar system of forces. Resultant of forces and the equilibrium of a body. Moment of a system of forces. Force couple. Analysis of a system of forces. Friction. Center of gravity. Pappus-Guldin theorems. Beams and trusses.
Normal and tangential stress. Stress and strain dependence. Allowed stress. Axial load, shear stress, torsion, bending, buckling. Combined loadings. Dimensioning of beams and shafts. Dynamic loads and strength.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

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Attending the lectures and exercises (min. 70%), attending the assessment and exams, and submitting the results of assignments.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2.5	Class participation	0.5	Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

According to the study rulebooks of the University of Rijeka and the Faculty of Maritime Studies:

- through continuous assessment during the semester (70% of learning outcomes)
  - 1. colloquium - learning outcomes 1-2 (25%),
  - 2. colloquium - learning outcomes 3-4 (25%),
  - homework assignments - learning outcomes 1-6 (20%),
- through final exam (30% of learning outcomes (5-6)) with passing rate set at min. 50% of final exam points.

Examples of evaluation in correlation to learning outcomes:

1. Determine the equilibrium of a body exposed to a system of forces.
2. Determine the free-body diagram of a rigid body.
3. Determine the free body diagram of a beam and determine the distribution of forces and moments.
4. Effect of simple and combined loadings on the solid body.
5. Determine stress, strain and stability of a beam, dimensioning of a beam.
6. Elastic stability of a beam.

1.10. Main Reading

J. Brnić: Statika, Tehnički fakultet, Rijeka, 2004.
J. Brnić, G. Turkalj: Nauka o čvrstoći I, Tehnički fakultet, Rijeka, 2004.

1.11. Recommended Reading

Video lectures on Merlin.
G. Vizentin, G. Vukelić, L. Murawski, N. Recho, J. Orović: Marine propulsion system failures - A review, Journal of marine science and engineering, 2020.
D. Pastorčić, G. Vukelić, J. Parunov, Ž. Božić: Fatigue life estimation of corroded welded steel joint using probabilistic approach, International journal of fatigue, 2024.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
J. Brnić: Statika, Tehnički fakultet, Rijeka, 2004.	10	80
J. Brnić, G. Turkalj: Nauka o čvrstoći I, Tehnički fakultet, Rijeka, 2004.	5	80

1.13. Quality Assurance

According to the ISO 9001 system set at the Faculty of Maritime Studies, Rijeka. Once a year, an analysis of the passing exam rate is conducted. Once a semester, an anonymous online survey of students is conducted.

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3.2. Course description

Generic information		
Head of Course	Goran Vizentin, PhD	
Course	Technology of materials and machining	
Study Programme	Marine engineering	
Type of Course	Compulsory	
Year of Study	1	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of this course is to provide the student with appropriate knowledge of materials and processing technologies and systems prescribed by STCW and IMO Model Courses for the service of Naval Navigation Officer.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. Compare the basic groups of technological materials.
2. Analyse the microstructure of materials, and the relationship between microstructure and material properties.
3. Define the basic properties of materials.
4. Analyse the basic technological processes of material processing.
5. Perform basic practical measurements with hand measuring tools.
6. Perform basic manual and machine processing: welding, measuring hardness, toughness of materials and identifying the structure of metals with a microscope.

1.4. Course Outline

Introduction to technical materials and strength tests and technological properties of materials, basics of metallography, basic methods of production of iron and steel, basics of heat treatment, fundamentals of plastic, ceramic, composite and natural materials. Fundamentals of particle separation, unconventional processing methods and technological welding processes.
Laboratory program: manual measurements; machining on a lathe, milling machine, drill grinder, sharpener; manual processing; manual welding with electrode coated and TIG process; measurement of static and dynamic strength of material with a trowel and trowel; measurement of hardness; measurement of material toughness; identifying the metal structure with a microscope.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Class attendance (minimum 70%), attending the assessment and exams, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1.5	Essay		Research	
Project		Continuous Assessment	1.5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka in the following way:

1. Learning outcomes are assessed through regular attendance and activity in class (5%), continuous assessment of knowledge through quizzes (65%) and a final exam (30%).

Examples of assessment of learning outcomes in relation to the set learning outcomes are:

1. Describe technical materials, strength testing and technological properties of materials.
2. Describe the basic processes of iron and steel production.
3. Describe the structure of atoms, the arrangement of atoms and irregularities in the atomic structure.
4. Describe iron-carbon alloys, basic properties and processes of iron, steel and non-ferrous metals production.
5. Describe the basics of heat treatment.
6. State the basics of the structure of plastic, ceramic, composite and natural materials.
7. List and describe the basic welding processes.

1.10. Main Reading

Katavić, I., Uvod u materijale, 2008
Tomac, N. Tehnički materijali i obrada, 2010.

1.11. Recommended Reading

Šestan, A.: Tehnologija materijala i obrade, 1997.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Tomac, N. Tehnički materijali i obrada, 2010.	15	

1.13. Quality Assurance

According to ISO 9001 system set at Faculty of Maritime Studies, Rijeka. Once a year analysis of passing exam rate. Once a semester anonymous students online survey.

[1] NOTE: 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Maja Skendžić, mag.cin.		
Course	Physical Education 1		
Study Programme	Marine Engineering		
Type of Course	Core		
Year of Study	1		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		1
	Number of Hours (L+E+S)		0+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goals of physical and health education are: understanding the principles of the biopsychosocial characteristics of the human being, acquiring knowledge about the factors that cause diseases and injuries, gaining a set of motor skills and information necessary for more meaningful use of free time, fulfilling the human biopsychosocial need for movement, developing humane interpersonal relationships, increasing creative abilities and adapting to modern living and working conditions, and through appropriate programs, enabling individuals to independently and responsibly take care of preserving and promoting their personal health, work capacity and other abilities.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

After completing the course, the student will be able to:

1. Positively influence anthropological characteristics (anthropometric traits)
2. Improve the acquisition of general and specific motor abilities, knowledge, skills and habits
3. Apply and utilize methods for maintaining and promoting health
4. Preserve health status through the application of physical exercise

1.4. Course Outline

Course Content Overview introducing students to the curriculum, class locations, and specific equipment. Assessing students' health status and levels of (in)activity. Measuring heart rate in various starting positions: lying down, sitting, standing. Running with changes in direction. Volleyball technique elements (V). Running; cyclic running up to 6 minutes. Running technique: coordination of breathing, arm and leg movement. Elective activity. Stretching exercises, including sport-specific flexibility routines. Loosening and relaxation exercises. Basic kinesiological transformations on board (ship). Movement coordination. Kinesiotherapeutic exercises for spine preservation in seafarers. Overhead passing and rebounding, underhand passing with forearms (V). Stretching – F. Climbing up and down ship ladders and ropes – M. Catching, passing, and shooting a basketball; ball handling (B). Development of general motor abilities (speed, precision). *Field work. Incorrect posture – physical exercise and prevention. Dance structures (English waltz) – F. Ball handling and play (N) – M. Player positions – playing with multiple players over the net (V). Evaluation of students' individual attendance status, based on presence or absence and participation in class activities. Elective game.

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1.5. Modes of Instruction	☐ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☒ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	Seminar paper is written by part-time students. Field work will be conducted if conditions and weather permit.	
1.7. Student Obligations		
Active attendance and participation in at least 70% of classes is required.		
1.8. Assessment[1] of Learning Outcomes		

Course attendance	0.5	Class participation	0.5	Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The course is not graded.
Students' motor activity is positively evaluated during classes. Each lesson, student attendance and participation are carefully monitored and recorded in a dedicated semester-long Physical and Health Education Attendance Sheet. The course *Physical and Health Education* is assessed for the respective semester by entering "PASSED" in the ISVU system.

1.10. Main Reading

1.11. Recommended Reading

1.Redžić A., Redžić M.: Križobolja i tjelesno vježbanje, HSSR Sport za sve. Godina XXXVI, broj 93.,2018
2. Findak V.: Metodika tjelesne i zdravstvene kulture, Školska knjiga Zagreb, 1999.
3. Anderson B.: Stretching, Vježbe istezanja za svakodnevni fitness: trčanje, plivanje, tenis, biciklizam, skijanje, košarka, nogomet i ostale sportove, Gopal, d.o.o., Zagreb, 1997
4. Anderson B., Burke E., Pearl B.: Fitnes za sve, Gopal, d.o.o., Zagreb, 1997.
5. Janković V. , N. Marelić.: Odbojka, Fakultet za fizičku kulturu Sveučilišta u Zagrebu, Zagreb 1995.
6. Kosinac, Z.: Kineziterapija, tjelesno vježbanje i sport kod djece i omladine oštećena zdravlja, Split, 1989.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in line with European standards and guidelines for quality assurance, as implemented at the Faculty of Maritime Studies in Rijeka.
Once a year, pass rate results are analyzed and appropriate measures are taken.

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General information		
Course holder	Ph.D., Jasminka Bonato	
Course	Marine Electrical Engineering	
Study program	Marine Engineering	
Course status	mandatory	
Year of study	1. undergraduate degree	
Score value and method of teaching	ECTS credits	5
	Number of hours (L+E+S)	30+30+0 (2+2+0)

1. DESCRIPTION OF THE SUBJECT

1.1. Course objectives

To introduce the basic physical laws in the field of electricity and magnetism, as well as examples of their practical application.

1.2. Course enrollment requirements

No.

1.3. Expected learning outcomes for the course

1. Explain the basic concepts of electrostatics and direct currents
2. Recognize the fundamental physical laws of electricity and magnetism in the course of auditory exercises on specific computational examples
3. Say the basic properties of magnetism
4. Show the basic expressions in electromagnetism
5. Apply the laws of electricity and magnetism in laboratory exercises
6. Analyze the application of theory through a variety of examples in technical practice

1.4. Course content

Electric charge. Electric forces and electric field. Electric field potential and electrical voltage. Capacity. Electric current in conductors. Electrical resistance and electrical conductivity. Direct current sources. DC Circuits. Energy and power. Magnetic forces, magnetic field, magnetic induction and magnetic flux. Magnetic field of conductor flowed by current. Force on conductor under current in magnetic field. Electromagnetic induction. Self-induction and inductance. Inter-induction and inter-inductance. Magnetic characteristics of ferromagnetic materials. Ferromagnetic Circuits. Variable and alternating currents. AC circuits. AC power and energy. Three-phase systems. Measurement of basic electrical quantities.

1.5. Types of teaching	x lectures ☐ seminars and workshops x exercises ☐ distance education ☐ field work	☐ independent tasks x multimedia and network ☐ laboratory ☐ mentoring work x homework
1.6. Comments		

1.7. Student obligations

Regular attendance at classes, passing exams that qualify students for the final or remedial exam, depending on their achievement in the written parts of the exam. Activity through which they analyze applications in technical practice. Throughout the semester, students also carry out laboratory measurements, where, in addition to the task of the exercise, they learn about basic measuring instruments, devices and methods of their connection.

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1.8. Monitoring student work

Class attendance	2	Teaching activity (homework)	0,5	Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Continuous assessment	1,5	Report		Practical work	
Portfolio		Final exam	1				

1.9. Procedure and examples of evaluation of learning outcomes during classes and at the final exam

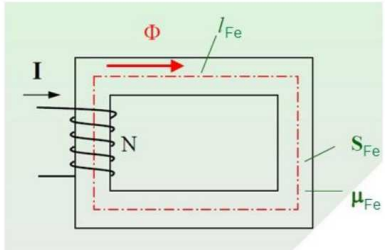
During classes 70% (colloquia + dz) and final exam 30%.

Examples of evaluating learning outcomes in relation to set outcomes:

Outcomes 1,2, 3 i 4

1. What specific conductivity (electrical conductivity) should the material used to make the heater of an electric stove have so that a wire of length l = 39 m and diameter d = 0.6 mm has an electrical resistance R = 55 Ω. What is the electrical conductivity of this heater?
2. For a simple magnetic circuit with a core made of ferromagnetic material of the shape shown in the figure, it is necessary to find the excitation current I if the magnetization table is given and if the following data are known:
   - $\Phi = 15$ [mWb]
   - $N = 100$
   - $l_{Fe} = 1$ [m]
   - $S_{Fe} = 0.01$ [m^2]

B [T]	1.1	1.2	1.3	1.4	1.5
H [A/m]	380	500	750	1200	1900



Final exam (outcomes 5,6)

1. Three-phase current will flow under the influence of three-phase voltage, and we can get it in three coils by applying the law:
a) self-induction
b) intermediate inductions
c) electromagnetic inductions
2. Instruments are used to measure alternating currents and voltages, which always show a mean value called:
a) maximum value
b) effective value
c) minimum value

1.10. Required literature (at the time of applying for the study program proposal)

Notes from lectures and exercises

1. A.Kraš, J.Čelić Fundamentals of Marine Electrical Ethics, Faculty of Maritime Studies, Rijeka;, Rijeka, 2016.
2. I. Kuzmanić: Marine Electrical Engineering and Electronics, Faculty of Maritime Studies in Split, Split, 2006.
3. I. Kuzmanić., I. Vujović: Fundamentals of Electrical Engineering - Collection of Solved Problems, Faculty of Maritime Studies in Split, Split, 2005.

1.11. Supplementary literature (at the time of application of the study program proposal)

1. V. Pinter; Fundamentals of Electrical Engineering, Book One, Technical Book Zagreb, 1989.
2. V. Pinter; Fundamentals of Electrical Engineering, Book Two, Technical Book Zagreb, 1989.

1.12. Number of copies of required literature in relation to the number of students currently attending the course

Title	*Number of copies*	Number of students
A.Kraš, J.Čelić Fundamentals of Marine Electrical Ethics, Faculty of Maritime Studies, Rijeka;, Rijeka, 2016.	5	52
V. Pinter; Fundamentals of Electrical Engineering, Book One, Technical Book Zagreb, 1989.	8	52
V. Pinter; Fundamentals of Electrical Engineering, Book Two, Technical Book Zagreb, 1989.	5	52

1.13. Ways of monitoring quality that ensure the acquisition of output knowledge, skills and competencies

The quality of studies is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance, which is carried out at the Faculty of Maritime Studies in Rijeka. Student survey conducted at the end of the semester.

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3.2. Course description

Generic information		
Head of Course	Rikard Miculinić, M.Sc.	
Course	Marine Engineering elements	
Study Programme	Marine engineering	
Type of Course	Obligatory	
Year of Study	1.	
Estimated Student Workload and Methods of Instruction	ECTS student workload coefficient	6
	Number of hours (M+V+S)	45+30+0

1. 1. GENERAL COURSE DESCRIPTION

1.1. Course objectives

The aim of the course is to introduce students to the types, function, structural forms, determining the size of machine elements based on permissible stresses in the material, as well as basic knowledge of technical design, which enables a participant in a ship's plant or workshop to read and create blueprints.

1.2. Prerequisites for Course Registration

1.3. Expected learning Outcomes

After passing the exam, students will be able to:
1. Explain the ISO standards of engineering graphics and the rules for making technical drawings.
2. Use and apply orthogonal and spatial projection
3. Display and apply sections and dimensions.
4. Calculate and apply tolerances and machining marks.
5. Read finished and create new technical drawings of machine elements with all necessary data for production.
6. Be able to create a technical drawing in a CAD program.
7. Differentiate between structural forms and materials of machine elements.
8. Show and explain the function of machine elements.
9. Analyze the load and stress of a machine element.
10. Determine the size of the element based on the allowable stresses in the material.

1.4. Course Outline

The course covers engineering graphics and machine elements. Engineering graphics includes basic standards in graphic communications (lines, technical writing, formats and scales). Orthogonal projection on two and three planes (points, lengths, planes and solids). Spatial representation of shapes (isometric, dimetric and oblique projection). Drawing sections and dimensions. Tolerances and surface roughness. Basic symbols in marine engineering.
Machine elements include connecting elements (fixed joints, clamping joints, detachable joints and springs), elements of circular motion and power transmission (axles, shafts, sleeves, bearings, couplings, belt drives, chain drives, friction drives and gear drives) and flow elements (pipes, lines and valves).

1.5. Modes of Instruction		
	☒ Lectures	☒ Practical work
	☐ Seminars and workshops	☐ Multimedia and network
	☒ Exercises	☐ Laboratory
	☒ E-learning	☐ Mentorship
	☐ Fieldwork	☐ Other _____

1.6. Comments	

1.7. Student obligations

1st midterm, 2nd midterm. In addition to mandatory lectures and exercises, the student is required to create a simple project as part of the 3rd program assignment

1.8. Assessment1 of Learning Outcomes

Course attendance		Class participation	2	Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project	1	Continuous Assessment	2	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The evaluation process of acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka in the following way: 70% in class, 30% in the final exam (outcomes 1 - 6). Of the possible 70% during the semester, 40% is for two written exams, 10% for completed exercises and 20% for completed programs.

The requirement for taking the final exam, according to the regulations, is 35%.
Examples of evaluation by individual outcome in the preliminary and final exams:

1. On the first preliminary exam, 20% is allocated to two graphic tasks (learning outcomes 1,2,3)
2. On the second preliminary exam, 20% is allocated to two spatial projection tasks (learning outcomes 1,2,5)
3. 10% is for correctly completed exercises. (learning outcomes 1,2,3,4,5,6)
4. 20% goes to two created program tasks (learning outcomes 1, 2, 3, 5, 6) with the obligatory creation of an exercise in CAD.
5. The final exam includes a written test of outcomes 7,8,9 and two assignments (learning outcome 4).

Examples of evaluation by individual outcome in the preliminary and final exams:
1. The object is given in spatial projection according to the figure. Draw the plan and side view in section, and the plan in elevation and dimension it (outcome 1,2,3).
2. The object is given in orthogonal projection. Draw the object in isometric (diametric or oblique projection) at the given scale (outcome 5).
3. Determine all necessary measurements/deviations of the fit, the type of fit, and draw a fit diagram with all necessary dimensions (outcome 4).
4. Bolted joints (deformation diagram)

1.10. Main Reading

Bukša, A., Grafičke komunikacije – Zbirka zadataka, Pomorski fakultet Rijeka, 2001.
Karl-Heinz Deecker, Elementi strojeva, Tehnička knjiga, Zagreb 2006.

1.11. Recommended Reading

1. Opalić M., Kljajin M., Sabastijanović S., Tehničko Crtanje, Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje, 2003.
2. Bukša A., Programski zadaci iz grafičkih komunikacija, Pomorski fakultet u Rijeci, Rijeka 1998.
Bukša A.: Izjednačenje opterećenja kod zupčanih prijenosa s višestrukim zahvatom u brodskim reduktorima i njihova konstruktivna rješenja, Zbornik radova Pomorskog fakulteta u Rijeci, God. 10, Rijeka 1996.
3. Bukša A., Istraživanje raspodjele opterećenja kod običnih zupčanih prijenosa s dijeljenjem ili spajanjem snage u brodskim reduktorima, “Naše more”, (1997)3-4, str. 135-141.
4. Bukša A. - Kralj P., Zupčani prijenosi u brodskim reduktorima porivnog sustava, “Naše more” (1998)1-2, str. 33-38.

5. Bukša A., - Kralj P., - Martinović D., Opterećenje vijenca centralnog zupčanika s unutrašnjim ozubljenjem kod planetarnih prijenosa u brodskim reduktorima, "Naše more", (1999) 2-3, str. 96-102.
6. Bukša A., - Kralj P., Opterećenje vijenca centralnog zupčanika s vanjskim ozubljenjem kod planetarnih prijenosa u brodskim reduktorima, Pomorstvo, god. 13, Rijeka 1999.
7. Bukša A.,- Kralj P., Martinović D., Istraživanje raspodjele opterećenja kod planetarnih prijenosa s elastičnim osovinama u brodskim reduktorima, Brodogradnja, god. 4, br. 1, Zagreb, 2001.
8. Koljesnikov O., Bukša A., Zupčani prijenosi brodskog porivnog sustava, Pomorstvo, god. 23, br. 2 (2009), str. 515 – 525.
9. Lamit, L. – Kitto, K., Principles of Engineering Drawing, St. Paul, West Publishing Company, 1994.
10. Prebil, Ivan, Tehnična dokumentacija, Ljubljana, Tehniška založba Slovenije, 1995.
11. Parker M.- Dennis L., Engineering drawing fundamentals, Cheltenhan, Stanley Thornes, 1990.
12. Parker M.- Pickup F., Engineering drawing with worked examples 1, Cheltenhan, Stanley Thornes, 1990.
13. Hercigonja, Eduard, Tehnička grafika, Zagreb, Školska knjiga, 1996.
14. Kovač, Branko, Tehničko crtanje, Zagreb, Školska knjiga, 1975.

1.12. Number of Main Reading Examples

Title	*Number of copies*	*Number of students*
Bukša, A., Grafičke komunikacije – Zbirka zadataka, Pomorski fakultet Rijeka, 2001.	12	50
The course material is available on the e-learning system – Merlin in electronic form.	-	50

1.13. Quality Assurance

The quality of studies is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exam taking is prepared annually, and a survey among students is conducted once a semester.

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Course description

Generic information			
Head of Course	Mirjana Borucinsky, PhD		
Course	English Language II		
Study Programme	Marine Engineering		
Type of Course	Core		
Year of Study	1	Semester	2
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		15+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to develop the students' ability for written and oral communication in English language using the basic terminology related to the properties of technical materials and their application in engineering, as well as the basic principle of operation of marine engines.

1.2. Prerequisites for Course Registration

Successful completion of *English language 1.*

1.3. Expected Learning Outcomes

The students are expected to be able to:

1. Demonstrate language skills in describing and classifying technical materials and their properties.
2. Using specialized terminology differentiate among the different types of marine propulsion and their characteristics.
3. Recognize parts of the engine, explain their function and the way they are assembled, using specialized terminology.
4. Turn reported speech into verbal communication (image-speech/writing).
5. Translate complex sentences from Croatian into English using specialized and general language dictionaries.

1.4. Course Outline

Materials and alloys, Material testing, mechanical and physical properties, Stress and strain, Ship's propulsion, Principles of a diesel engine operation and basic components, Marine boilers, operation and elements, Auxiliary machinery, turbines, basic parts and principle of operation, Tenses, passive voice, modal verbs and articles.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Class attendance, activities, continuous assessment and final exam (written and oral)

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1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio		Final exam	1				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70 % in class, 30 % at the final exam (outcomes 1-5).
1st mid-term exam (30 %) for outcomes 1, 2
2nd mid-term exam (30 %) for outcomes 3 - 5
Activity in class (doing exercises in the learning platform Merlin) (10 %)
Final oral exam (30 %) (outcomes 1-5)

Examples of assessment for each outcome in mid-term exams:
1. Describe and classify technical materials and their properties using specialized terminology.
2. Using specialized terminology single out the advantages and disadvantages of different types of marine propulsion and their specific characteristics
3. Recognize engine parts, explain in English their function and the way they are assembled.
4. Describe a diagram or a scheme in writing in English.
5. Translate complex sentences from Croatian into English using specialized and general language dictionaries

Examples of assessment for each outcome in the final exam:
1. Using specialized terminology present and classify technical materials and their properties.
2. Using specialized terminology single out the advantages and disadvantages of different types of marine propulsion and their specific characteristics.
3. Recognize parts of the engine in the picture, describe their purpose using specialized terminology.
4. Describe a diagram or a scheme orally.
5. Provide an oral translation of complex sentences from Croatian into English using specialized and general language dictionaries.

1.1. Main Reading

1. Spinčić, A.-Pritchard, B.: *An English Textbook for Marine Engineers I,* Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.

2. Luzer, J. Spinčić. A*: Gramatička vježbenica engleskog jezika,* Pomorski fakultet, III izdanje, Rijeka 2003.

1.2. Recommended Reading

MarEng, Web-based Maritime English Learning Tool, EU Leonardo Project
Moodle.srce.hr

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Spinčić, A.-Pritchard, B. *An English Textbook for Marine Engineers* Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.	70	70
Luzer, J. Spinčić. A: *Gramatička vježbenica engleskog jezika*, Pomorski fakultet, III izdanje, Rijeka 2003.	70	70

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.4. Quality Assurance
The quality of the course is monitored in accordance with the ISO 9001 system and the European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the course are analyzed and appropriate measures implemented accordingly.

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3.2. Course description

Generic information			
Head of Course	Dr. Sc. Biserka Draščić Ban, Ivan Tudor, mag. educ.		
Course	Mathematics 2		
Study Programme	Marine Engineering		
Type of Course	Mandatory		
Year of Study	1st year		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of Mathematics 2 is to provide students with basic mathematical knowledge and skills necessary for understanding and solving problems in maritime professions and related technical disciplines. Special emphasis is placed on the application of differential and integral calculus to develop analytical skills and provide a foundation for further professional education. Through practical examples, students will connect mathematical methods with challenges in the maritime sector.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

After completing and passing the course, students will be able to:

1. Analyze functions using differential calculus.
2. Calculate indefinite integrals using various methods (direct integration, substitution, integration by parts).
3. Calculate and apply definite integrals and theorems of integral calculus.
4. Use improper integrals and numerical integration methods.
5. Solve first-order differential equations.
6. Analyze the domain, limit, and continuity of multivariable functions.
7. Calculate partial derivatives and determine extrema of functions with two variables.
8. Apply differential and integral calculus to solve practical problems in engineering, physics, and other fields.

1.4. Course Outline

Application of differential calculus to function analysis, curvature, evolute, involute, antiderivatives, tabular integrals, integration methods, definite integrals and their properties, Newton–Leibniz formula, improper integrals, series, convergence of series with positive real terms, convergence criteria, alternating series, power series, differential equations: homogeneous, linear, Bernoulli equations, multivariable functions, limits of multivariable functions, partial derivatives, total differential, Schwarz's theorem, extrema of multivariable functions, conditional extrema.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Students are required to actively attend lectures and exercises. All continuous assessments and tests affect the final grade.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Two knowledge checks during the course account for 60% of the learning outcomes:

- 1st check: 30% (outcomes 1, 2, 3, 8)
- 2nd check: 30% (outcomes 4, 5, 6, 7, 8)

Two tests assess 10%:

- 1st test: 5% (outcome 2)
- 2nd test: 5% (outcome 7)

Final exam assesses the remaining 30% (outcomes 1, 3, 6, and 8).

Examples of learning outcome evaluation:

1. Analyze and graph the behavior of a function $f(x)=\frac{1-x^2}{x^2+1}$ (Outcome 1)
2. Calculate: $\int \frac{4x+2}{x^2+x+1}dx$ (Outcome 2)
3. Calculate the volume of a solid generated by rotating the region bounded by $y^2 = x^2 + 2$ and $y = x$ (first quadrant) around the x-axis. Draw it. (Outcome 3)
4. Use the trapezoidal and Simpson's rule (n = 8, 5 decimal places) to evaluate an integral $\int_2^4 \frac{\sqrt{1+2x}}{e^x-1}dx$. (Outcome 4)
5. Solve a given first-order differential equation. $y'(y^3+1)(1+x^2)=xy$ (Outcome 5)
6. Determine the domain of a given function. $f(x,y)=x^2+2y^2+2xy-6x-10y+50$ (Outcome 6)
7. Find the extrema of a two-variable function. $f(x,y)=x^2+2y^2+2xy-6x-10y+50$ (Outcome 7)
8. A ship hull has a semicircular cross-section of radius R = 5 m. The ship is 10 m long and submerged to a depth of h = 3 m. Calculate the volume of the submerged part. (Outcome 8)

1.10. Main Reading

- Course materials on the e-learning platform – Merlin (https://moodle.srce.hr)

- R. Dobrosavljević, Ž. Glavan, I. Kitarović, Z. Zenzerović, *Mathematics 2*, Faculty of Maritime Studies in Rijeka, 1982

- B. P. Demidovič, *Problems and Solved Examples in Mathematical Analysis for Technical Faculties*, Tehnička knjiga, Zagreb, 2003

1.11. Recommended Reading

- P. Miličić, M. Uščumlić, *Collection of Higher Mathematics Problems II*, Naučna knjiga, Belgrade, 1971
- S. Kurepa, *Mathematical Analysis, Part Two: Single-Variable Functions*, Tehnička knjiga, Zagreb, 1971
- S. Kurepa, *Mathematical Analysis 3: Multivariable Functions*, Tehnička knjiga, Zagreb, 1989
- D. Blanuša, *Higher Mathematics, Part I*, Tehnička knjiga, Zagreb, 1963

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
R. Dobrosavljević et al., *Mathematics II*, Faculty of Maritime Studies in Rijeka	10	60
B. P. Demidovič, *Problems and Solved Examples in Mathematical Analysis*	5	60

1.13. Quality Assurance

Study quality is monitored in accordance with the ISO 9001 system and aligned with European standards and guidelines for quality assurance implemented at the Faculty of Maritime Studies in Rijeka. Results are reviewed annually, and appropriate measures are taken.

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3.2. Course description

Generic information			
Head of Course	Prof. Goran Vukelić, PhD.		
Course	Engineering Mechanics 2		
Study Programme	Marine Engineering		
Type of Course	Compulsory		
Year of Study	1		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	5	
	Number of Hours (L+E+S)	30+15+0	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquiring theoretical knowledge that is the basis for problem solving in the field of kinematics, dynamics and fluid mechanics.

1.2. Prerequisites for Course Registration

Completed “Engineering Mechanics 1”.

1.3. Expected Learning Outcomes

After passing the exam, the student will be able to:
1. Apply the laws of mechanics to solve the problems of particle, body and system motion.
2. Analyze the motion of mechanisms.
3. Apply the laws of mechanics to solve the problems of fluid statics.
4. Apply the laws of mechanics to solve the problems of fluid dynamics.
5. Analyzing the suitability of a pipeline and its elements regarding fluid mechanics parameters.

1.4. Course Outline

Coordinate system and position of a body within it. Motion. Degrees of freedom. Kinematics of a particle: rectilinear and curvilinear motion. Kinematics of a rigid body: translation, rotation, planar motion. Kinematics of planar mechanisms.
Dynamics of a particle: inertia, inertia force, D’Alembert principle, impulse. Work, energy, and power.
Fluid mechanics: general physical values and parameters. Fluid statics. Pressure and change of pressure. Measuring the pressure. Pressure force. Buoyancy. Stability of a floating body. Pascal law. Hydraulic press. Fluid motion. Laws of fluid motion. Euler and Bernoulli equation. Application of the Bernoulli equation. Fluid flow. Laminar and turbulent flow. Flow of ideal and real fluid. Flow losses. Fluid circulation. Cavitation.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

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1.7. Student Obligations

Attending the lectures and exercises (min. 70%), attending the assessment and exams, and submitting the results of assignments.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation	0.5	Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

According to the study rulebooks of the University of Rijeka and the Faculty of Maritime Studies:

- through continuous assessment during the semester (70% of learning outcomes)
  - 1. colloquium - learning outcomes 1-2 (25%),
  - 2. colloquium - learning outcomes 3 (25%),
  - homework assignments - learning outcomes 1-5 (20%),
- through final exam (30% of learning outcomes (4-5)) with passing rate set at min. 50% of final exam points.

Examples of evaluation in correlation to learning outcomes:

1. Determine the dynamic equilibrium of a body in planar motion.
2. Compare the motion of several interconnected bodies based on the set criterion.
3. Calculate pressure, change of pressure, pressure force, and buoyancy.
4. Use the Euler and Bernoulli equations to determine the motion parameters of the fluid.
5. Determine the losses in a pipeline.

1.10. Main Reading

Žigulić, R, Braut, S.: Kinematika, Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 2012.
Krpan, M., Butković, M., Žigulić, R., Braut, S., Franulović, A.: Dinamika, Tehnički fakultet, Rijeka, 2001.
Pečornik, M.: Tehnička mehanika fluida, Školska knjiga, Zagreb, 1985.

1.11. Recommended Reading

Video lectures on Merlin.
Jecić, S.: Tehnička mehanika II - Kinematika i dinamika, Tehnička knjiga, Zagreb, 1995.
Zandinava, B., Bakhtiari, R., Vukelić, G.: Failure analysis of a gas transport pipe made of API 5L X60 steel, Engineering failure analysis, 2022.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Žigulić, R, Braut, S.: Kinematika	5	80
Krpan, M. et al.: Dinamika	5	80

1.13. Quality Assurance

According to the ISO 9001 system set at the Faculty of Maritime Studies, Rijeka. Once a year, an analysis of the passing exam rate is conducted. Once a semester, an anonymous online survey of students is conducted.

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Course description

Generic information			
Head of Course	Srđan Žuškin, PhD		
Course	Ship design and construction		
Study Programme	Marine Engineering		
Type of Course	Mandatory		
Year of Study	1st year	2nd semester	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		60 + 30 + 0 (4 + 2 + 0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The first objective of the course is to acquaint students with the basic ship's dimensions and measures, transversal and longitudinal constructional elements, the elementary conception of the ship's strength and constructional features of different types of ships together, and International rules for ship construction. The second objective of the course is based on ship stability elaboration, statical and dynamical stability, and ship stability in loading/unloading or shifting mass.

1.2. Prerequisites for Course Registration

No prerequisites

1.3. Expected Learning Outcomes

It is expected that the student will be able to:

1. Parse and apply international rules for the ship's construction and historical development.
2. Parse and analyze the type of ship construction and structural elements of longitudinal and transversal ship strength.
3. Parse and analyze ships' mooring, anchor equipment, together with cargo handling equipment.
4. Parse and apply basic ship dimensions and measures with ship drawings.
5. Properly analyze the ship's division toward different constructional characteristics
6. Properly analyse the technical and technological characteristics of different types of ships according to purpose, type of cargo, navigational water categories, construction material, nature of shipping service, etc.
7. Parse and define different stability divisions according to stability criteria.
8. Parse and define initial transverse stability with basic elements of transverse static stability.
9. Parse and define the elements of transverse statical stability in mass-shifting and transshipment (loading and discharging).
10. Analyse the influence of Free Surface Correction (FSC) on transverse statical stability.
11. Parse and define longitudinal stability with basic elements.
12. Parse and define the elements of longitudinal stability in mass shifting and transshipment (loading/unloading).
13. Parse and define the dynamical stability and damage stability regulations.

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1.4. Course Outline

International rules for ship construction and historical development. Construction materials, welding, bulkheads, watertight bulkhead, watertight door. Type of ships. Structural elements of longitudinal and transversal ship's strength. Strength and stress of ship structure. Ship compartments, cargo compartments, navigation bridge, and engine room. Ship's cargo handling equipment for different types of ships. Ship's operational equipment. Type of rudders, remarks for different kinds of rudders, propeller execution with main particularities. Geometrical ship's dimensions and measures. Ship drawings and design. The general plan of the ship with different system technology. Wind surface and underwater area. Ship's division toward purpose, type of cargo, navigational water categories, construction material, nature of shipping service, etc. Technical and technological characteristics for General Cargo ships, Container Ships, Ro-Ro vessels, Bulk Carriers, Oil/Oil products and Chemical Tankers, Gas takers, Passenger liners and cruise ships, and offshore vessels with different purposes and services.
Ship stability definition and division. Basic ship hydrostatics. Statical initial transverse metacentric high. Transverse statical stability change in vertical and horizontal mass shifting. Transverse statical stability change in mass transshipment (loading/unloading). Transverse statical stability change in hanging loads. Influence of Free Surface Correction (FSC) on transverse statical stability. Statical transverse stability at large angles of the heel. GZ curve construction with Intact stability regulations analyses. KG calculation in transverse stability. Statical longitudinal stability. Longitudinal stability changes in mass shifting or transshipment (loading/unloading). XG calculation in longitudinal stability. Dynamical stability analyses. Damage stability. Ship's trim and stability book.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	The Learning Outcomes in this course are under STCW regulation.	

1.7. Student Obligations

Active attendance of classes over 70 %. Longitudinal and transversal ship drawing – student task.
Passed two written exams. Final oral exams.

1.8. Assessment[1]t of Learning Outcomes

Course attendance	3,0	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,3	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio		Independent task	0,2				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70 % of the course grade is based on 2 written exams in class, and 30 % of the course grade is based on the oral final exam, according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka. Practical work is based on transversal and longitudinal ship drawing creation tasks. Continuous assessment: Each written exam must have at least 60% score.
1st written exam – Ship design and construction (learning outcomes 1-6)
2nd written exam – Ship stability (learning outcomes 7-13)
The final oral exam (learning outcomes 1- 13) checks the competencies of theoretical knowledge, where it is necessary to achieve all learning outcomes.

[1] NOTE: 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. Use empty fields for additional activities.

Examples of Learning Outcome Assessment in Relation to the Set Learning Outcomes:

1. Describe the development of the double hull system throughout history.
2. Classify and describe the transverse structural elements that support the ship's deck.
3. Explain the ship's anchoring system and list and classify different types of anchors.
4. Explain what ship draft is and draw a water line between 8 and 9 meters.
5. Explain and list the types of ships according to cargo type.
6. Draw and explain a cross-section of a bulk carrier with the corresponding structural elements.
7. Define the classification of initial transverse stability according to the angle of heel.
8. Analyze and graphically present the elements of initial transverse stability.
9. Analyze the elements of a ship's initial transverse stability during ballast loading into the double bottom ballast tank.
10. Explain how the free surface influences the initial transverse metacentric height.
11. Analyze and graphically present the elements of longitudinal stability.
12. Analyze the elements of a ship's longitudinal stability during cargo loading into hold No. 1.
13. Explain the elements of transverse and longitudinal stability of a damaged ship during flooding.

1.10. Main Reading

1. Barrass, C.B., Derrett, D.R., Ship Stability for Masters and Mates; Butterworth-Heinemann, 2022.
2. Buljan, I., Stabilnost broda, Priručnik za pomorce, Školska knjiga Zagreb, Zagreb, 1982.
3. Komadina, P., Brodovi multimodalne prijevozne tehnologije, Pomorski fakultet u Rijeci, Rijeka, 2001.
4. Komadina, P., Ro-Ro brodovi, Pomorski fakultet u Rijeci, Rijeka, 2001.
5. Komadina, P., Tankeri, Pomorski fakultet u Rijeci, Rijeka, 1994.
6. Nastavni materijal na sustavu za e-učenje – Merlin (https://moodle.srce.hr)
7. Ocean Technologies Group – Ocean Learning Platform (OLP); training solutions (e – learning)

1.11. Recommended Reading

Books

1. Eyres, D. J., Ship Construction, Butterworth-Heinemann, London, 2007.
2. Milošević, M., i Š., Osnove teorije broda 2, Sveučilište u Zagrebu, Zagreb, 1981.
3. Milošević, M., i Š., Osnove teorije broda 1, Sveučilište u Zagrebu, Zagreb, 1981.
4. Munsart, Craig A., A Cruise ship primer : history & operations, Atglen : Schiffer, cop. 2015.
5. Nautical Institute, A guide to bulk carrier operations, London, 2020.
6. Todorov, D.M., Ro-Ro handbook: a practical guide to roll-on roll-off cargo ships, monografija (knjiga), Atglen : Schiffer, cop. 2016.
7. Vademecum Maritimus, Podsjetnik pomorcima, Pomorski fakultet u Rijeci, Rijeka, 2002.
8. Dokkum, K., Katen, H.T., Koomen K., Pinkster J., Ship Stability, London, 2001.

Scientific papers from the head of the course related to the subjects

1. Grubišić, N., Dundović, Č., Žuškin, S., A split task solution for quay crane scheduling problem in mid-size container terminals // Tehnički vjesnik = Technical gazette, 23 (2016), 6; 1723-1730
2. Jovanović, F, Rudan, I., Žuškin, S., Sumner, M., Comparative analysis of natural gas imports by pipelines and FSRU terminals // Pomorstvo : scientific journal of maritime research, 33 (2019), 1; 110-116. doi: 10.31217/p.33.1.12
3. Sumner, M., Žuškin, M., Žuškin, S., Hess, M., Coopetitive game fundamentals and concept model representation for LNG transportation industry // Proceedings of the International Association of Maritime Universities (IAMU) Conference 2023 / Sviličić, Boris (ur.). Helsinki: Satakunta University of Applied Sciences (SAMK), 2023. str. 107-112

4. Šakan, D., Žuškin, S., Rudan, I., Brčić, D., Container ship fleet route evaluation and similarity measurement between two shipping line ports // Journal of marine science and engineering, 11 (2023), 2; 1-16. doi: 10.3390/ jmse11020400
5. Žuškin, S., Optimizacija rasporeda tereta na kontejnerskim brodovima u funkciji skraćenja prekrcajnoga procesa/ Komadina, Pavao (mentor). Rijeka, Pomorski fakultet u Rijeci, 2015.

Web sources
1. https://www.wartsila.com/encyclopedia
2. http://struna.ihjj.hr/
3. https://www.pfri.uniri.hr/bopri/IMEC_Proceedings/Rjecnik_Eng_Hrv.pdf

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Barrass, C.B., Derrett, D.R., Ship Stability for Masters and Mates; Butterworth-Heinemann, 2022.	Online	70
Buljan, I., Stabilnost broda, Priručnik za pomorce, Školska knjiga Zagreb, Zagreb, 1982.	10	
Komadina, P., Brodovi multimodalne prijevozne tehnologije, Pomorski fakultet u Rijeci, Rijeka, 2001.	10	
Komadina, P., Ro-Ro brodovi, Pomorski fakultet u Rijeci, Rijeka, 2001.	10	
Komadina, P., Tankeri, Pomorski fakultet u Rijeci, Rijeka, 1994.	10	
Nastavni materijal na sustavu za e-učenje – Merlin (https://moodle.srce.hr)	Online	
Ocean Technologies Group – Ocean Learning Platform (OLP); training solutions (e – učenje)	Online	

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with the European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, exam passing results are analyzed, and appropriate measures are adopted.

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3.2. Course description

Generic information			
Head of Course	Maja Skendžić, mag.cin.		
Course	Physical Education 2		
Study Programme	Marine Engineering		
Type of Course	Core		
Year of Study	1		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		1
	Number of Hours (L+E+S)		0+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goals of Physical and Health Education are: to understand the principles of the biopsychosocial characteristics of the human being, to acquire knowledge about the factors that cause illnesses and injuries, to adopt a set of motor skills and information necessary for more meaningful use of free time, to satisfy the human biopsychosocial need for physical activity, to develop humane interpersonal relationships, to enhance creativity, to adapt to modern living and working conditions, and through appropriate programs, to equip individuals for independent and responsible care for the preservation and promotion of personal health, as well as work and other abilities.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

Upon completion of the course, the student will be able to:

1. Demonstrate a positive impact on functional abilities.
2. Develop more meaningful use of leisure time.
3. Assess and improve the ability to solve everyday motor tasks.
4. Choose appropriate ways to perform motor tasks in urgent situations.

1.4. Course Outline

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Measuring resting heart rate, measuring heart rate after 6 minutes of physical effort (M) and measuring heart rate after a 2-minute run (F). Optional activity. Volleyball skills – underhand and overhand serves, blocking, setting, spiking and playing the third hit. Volleyball rules and their application in the game (O). Catching, passing and dribbling in basketball. Basketball rules and their application in the game (K). Weightlifting and other strength exercises aimed at preserving spinal health (mariners). Polystructural complex movements: soccer (M), volleyball (F). Rope exercises in place and in motion. A new basketball game involving three teams. Adapted dodgeball with a large Pilates ball. Tug of war. Elective polystructural complex movements. Volleyball rules and their application in the game (O). Development of general motor skills (coordination, flexibility). *Field work. Situational passing and setting in volleyball (O). Dance structures (Viennese waltz) – (F). Football technique, playing in groups of three (N). Group work to develop basketball motor skills (K).
Low and high starts (technique refinement), cyclic movements at various tempos. Assessment of individual student status based on attendance and participation in class activities.
Elective kinesiology activity.

1.5. Modes of Instruction	☐ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☒ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	Seminar paper is written by part-time students. Field work will be conducted if conditions and weather permit.	

1.7. Student Obligations

Active attendance and participation in at least 70% of classes is required.

1.8. Assessment[1] of Learning Outcomes

Course attendance	0.5	Class participation	0.5	Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The course is not graded.
A prerequisite for attending and completing this course is passing the course Physical and Health Education 1.
During the course, students' motor activities are positively evaluated.
Each student's attendance and participation are carefully recorded in a dedicated semester-long Physical and Health Education Attendance Sheet during every class.
The course is recorded in the ISVU system as "PASSED" (POLOŽIO) for the respective semester.

1.10. Main Reading

1.11. Recommended Reading

1.Redžić A., Redžić M.: Križobolja i tjelesno vježbanje, HSSR Sport za sve. Godina XXXVI, broj 93.,2018
2. Findak V.: Metodika tjelesne i zdravstvene kulture, Školska knjiga Zagreb, 1999.
3. Anderson B.: Stretching, Vježbe istezanja za svakodnevni fitness: trčanje, plivanje, tenis, biciklizam, skijanje, košarka, nogomet i ostale sportove, Gopal, d.o.o., Zagreb, 1997
4. Anderson B., Burke E., Pearl B.: Fitnes za sve, Gopal, d.o.o., Zagreb, 1997.
5. Janković V. , N. Marelić.: Odbojka, Fakultet za fizičku kulturu Sveučilišta u Zagrebu, Zagreb 1995.
6. Kosinac, Z.: Kineziterapija, tjelesno vježbanje i sport kod djece i omladine oštećena zdravlja, Split, 1989.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in line with European standards and guidelines for quality assurance, as implemented at the Faculty of Maritime Studies in Rijeka.
Once a year, pass rate results are analyzed and appropriate measures are taken.

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Course description

Generic information			
Head of Course	Aleksandar Cuculić, Ph. D.		
Course	Marine electrical machines and drives		
Study Programme	Marine Engineering		
Type of Course	Undergraduate		
Year of Study	2	Semester	3
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		**45 + 30 + 0 (3 + 2 + 0)**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of this course is to provide students with the necessary knowledge in the field of ship electrical machinery and propulsion as prescribed by STCW and IMO Model Courses for the service of engineer officer.

1.2. Prerequisites for Course Registration

Completed courses: Marine Electrotechnics

1.3. Expected Learning Outcomes

The student is expected to be able to:

1. Identify key safety measures and rules when working with electricity and apply them in simulated and real situations, describe relevant legislative regulations, analyse the impact of shipboard environmental conditions on electrical devices.
2. List the main types of shipboard electrical machines, describe the function, construction and operation of each type of electrical machine, and know electrical diagrams and symbols related to electrical machines.
3. Demonstrate basic installation and maintenance procedures for shipboard electrical machines analyse the causes of failures in electrical machines and propose solutions.
4. Explain the process of generating electricity using synchronous generators and other sources, demonstrate the procedure for parallel operation of generators, apply methods for load distribution between generators and analyse problems that may arise during parallel operation and propose solutions.
5. List the types of marine electric motor drives, describe the operation and application of each type of electric motor drive, demonstrate maintenance procedures for electric motor drives, analyse the performance of different electric motor drives and suggest improvements.
6. Identify different types of electric motor starters, describe the function and operation of each type of electric motor starter, demonstrate maintenance procedures and reading electrical diagrams of electric motor starters, describe the basic functions and maintenance of the ship lighting system.

1.4. Course Outline

Safety procedures for work with electricity. The influence of ship conditions on electrical machines and devices. The principle of operation of electrical machines. Single-phase and three-phase transformers. DC machines. Asynchronous machines. Synchronous machines. Production of electricity on board. Ship electric motor drives. Conventional starting methods of electrical machines. Starting and control of electrical machines with power electronics circuits. The influence of electric motor drives on power quality. Ship lighting systems.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular follow-up of classes (lectures and exercises), solving of written exams, and passing the oral final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,5	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating achieved learning outcomes is conducted in accordance with the Regulations on Studies of the University of Rijeka and the Regulations on Studying of the University of Rijeka, Faculty of Maritime Studies, as follows:

1. Through the evaluation of learning outcomes in continuous assessment (during classes), where the student can earn 70% of the total grade points:

   First midterm exam – 35% of the grade points
   Second midterm exam – 35% of the grade points

   The midterm exams are written. The student must achieve at least 50% of the available grade points on each midterm exam. Since a passing threshold of 50% has been set for mandatory continuous assessment, the student is allowed one retake of such an assessment.

2. Through the final exam (after earning the right to take it by collecting a sufficient number of grade points during classes):

   Final exam – 30% of the grade points

   The final exam is oral. The student must achieve at least 50% of the available grade points on the exam.

Examples of learning outcome evaluation in relation to the defined learning outcomes 1–6:

1. Describe the procedure and list the steps required for disconnecting and isolating an electrical device to ensure safety during maintenance and repair work. (Learning outcome 1)
2. Sketch the equivalent circuit of a transformer and explain the role of the elements in the equivalent circuit. (Learning outcome 2)
3. Describe the procedure and demonstrate the testing of insulation and continuity of electric motor windings. (Learning outcome 3)
4. Demonstrate the procedure for synchronizing a generator to the grid and connecting it for parallel

[1] NOTE: 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. Use empty fields for additional activities.

operation (Learning outcome 4)
5. Describe how the power supply and protection system of the steering gear electric drive is implemented (Learning outcome 5)
6. On a star-delta starter wiring diagram, identify the symbols of the components and describe the sequence of switching during motor startup. (Learning outcome 6)

1.10. Main Reading

Teaching materials on the Merlin e-learning system (https://moodle.srce.hr)

1.11. Recommended Reading

1. Hall, Dennis T. Practical marine electrical knowledge. Witherby Seamanship International,2020.
2. Patel M. R.; Shipboard electrical power systems. Crc Press, 2021.
3. B.Skalicki, J.Grilec, Električni strojevi i pogoni , Fakultet strojarstva i brodogradnje, Zagreb 2005.
4. B.Skalicki, J.Grilec, Brodski električni uređaji , Fakultet strojarstva i brodogradnje, Zagreb 2000.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials on the Merlin e-learning system	Available on Web	50

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information			
Head of Course	Fran Torbarina, Ph.D.		
Course	Thermodynamics and heat transfer		
Study Programme	Marine Engineering		
Level	Undergraduate		
Type of Course	STCW - obligatory		
Year of Study	2		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		7
	Number of Hours (L+E+S)		60 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Understanding and knowing how to describe thermal state of fluids and solids, the conversion of heat into other forms of energy, various thermal processes and machines and heat transfer mechanisms.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

After attending and passing the course, students will be able to:

1. Define properties of state, concept of equilibrium and laws of thermodynamics
2. Explain and analyse the energy conservation law, transfer of energy, thermodynamic work and First law of thermodynamics
3. Define and explain the properties of the substance, ideal gases, specific heat and mixing of gases and vapours.
4. Explain and analyse thermodynamic cycles, reversible and irreversible processes, entropy, enthalpy and loss of work in irreversible processes.
5. Define and explain vaporization and liquefaction, steam and cooling processes and cycles, carnotization of steam cycles, exergy and anergy.
6. Define, explain and analyse heat transfer, dimensionless numbers, thermal insulation and greenhouse effect.
7. Calculate and demonstrate overall heat transfer and capacity of heat exchanger.

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1.4. Course Outline

- Introduction, properties of state, the concept of equilibrium, Zeroth law of thermodynamics, aggregate states, Molecular-kinetic theory of thermodynamics, gas pressure and volume.
- The first law of thermodynamics, heat transfer, conservation of energy, Joule's experiments, internal energy, the First Law, the Ideal gas law, thermodynamics work, Avogadro's principle, specific heat capacity, ideal gas mixtures, ideal gas state changes.
- The Second law of thermodynamics, thermodynamics cycles, Carnot and Joule's cycles, reversible and irreversible process, Second law equation, Entropy, maximum work, technical work, Enthalpy, loss of work in irreversible process.
- Vaporization and Liquefaction, Phase diagram, Critical point, Triple point, Sublimation, vaporization heat exchange, Clapeyron-Clausius equation, state changes of vapor, steam cycles processes, Carnotization of steam process, the Mollier diagram of Entalpy (h-s chart), Exergy and Anergy, Cooling process
- Heat transfer, thermal Conduction, thermal Convection, Overall heat transfer, Dimensionless Nusselt, Reynolds, Prandtl and Grashof Numbers, thermal Radiation, Greenhouse effect.

1.5. Modes of Instruction	X Lectures ☐ Seminars and workshops X Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other
1.6. Comments		

1.7. Student Obligations

Students are required to:
attendance at min. 70 % of lectures,
passing all written exams (min. 50%) – Continuous Assessment
final exam – Oral exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	3	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,5	Essay		Research	
Project		Continuous Assessment	2,5	Presentation		Practical work	
Portfolio							

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure of evaluating the accomplished learning outcomes is carried out according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- 70% of the accomplished learning outcomes is evaluated through continuous testing of knowledge during classes
- 30% of the accomplished learning outcomes is evaluated at the final exam. To pass the final exam, a student must realize a minimum of 50% of the final exam points

Continuous assessment:

1. Written exam – theory – learning outcomes 1 – 5
2. Written exam – exercises – outcomes 1 – 5
3. Written exam – exercises – outcomes 6 and 7.

Final exam:

On final oral exam complete field of Thermodynamics and heat transfer is assessed (learning outcomes 1 – 7) with particular reference to learning outcomes 6 and 7.

Examples of assessment for outcome:

1. Define and analyze at least 6 properties of state with their units. (Outcome 1)
2. In well insulated tank is mixing 50 l of water with 500 W mixer. Calculate temperature increase after 2 hours. In how much time will temperature increase for 2 Celsius degrees? (Outcome 2)
3. Explain the appearance of vapor in humid air at 15 degrees Celsius. (Outcome 3)
4. The Joule process with hot air takes place between pressures 10 bar and 1 bar, while the highest and lowest temperatures in the process are 673 K and 288 K. Determine the thermal efficiency of the process and draw the process in *p-v* diagram. (outcome 4)
5. Explain the concept of entropy and determine the entropy increase of the air in a room of 295 k. (outcome 5)
6. Explain Rankine's process by which supercharged water vapor enters the turbine. Explain how heat balances are determined and how values that are included in heat balances are obtained! Outcome 6)
7. Explain heat transfer through two vertical walls of different material and thickness. On one side of the walls there is hot gas and on the other side is cold liquid. Draw a flow chart and determine the thermal resistance! (outcome 7)

1.10. Main Reading

1. Teaching materials for the e-course are available on the e-learning platform - Merlin.
2. F. Bošnjaković, *Nauka o toplini I Dio*, Tehnička knjiga Zagreb, 1978.
3. F. Bošnjaković, Nauka o toplini II Dio, Tehnička knjiga Zagreb, 1976.
4. B. Halasz, *Uvod u termodinamiku*, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu, 2015

1.11. Recommended Reading

1. F. Torbarina, K. Lenić, A. Trp, M. Kirinčić, *Parametric analysis of system performance and cost of heating systems with heat pump and latent thermal energy storage*, Applied Thermal Engineering 252, 123717, 2024.
2. F. Torbarina, K. Lenić, A. Trp, *Computational Model of Shell and Finned Tube Latent Thermal Energy Storage Developed as a New TRNSYS Type*, Energies 15(7), 2434, 2022.
3. F. Torbarina, A. Trp, K. Lenić, *Numerical Analysis of Geometry Influence on Heat Transfer in a Slotted Fin and Tube Heat Exchanger*, Heat Transfer Engineering 44 (5), 2023.
4. M. D. Burghardt, *Engineering Thermodynamics with Applications*, Harpercollins College Div, Subsequent edition, November 1, 1986
5. N. Petric, I. Vojnović, V. Martinac, *Tehnička termodinamika*, HINUS Zagreb, 1999.
6. A. Kostelić, *Nauka o toplini*, Školska knjiga Zagreb, 1975.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
F. Bošnjaković, Nauka o toplini I Dio, Tehnička knjiga Zagreb, 1978	10	70
F. Bošnjaković, Nauka o toplini II Dio, Tehnička knjiga Zagreb, 1976.	10	70
B. Halasz, Uvod u termodinamiku, Fakultet strojarstva i brodogradnje Sveučilišta u Zagrebu, 2015	10	70
Nastavni materijal za e-kolegij dostupan na sustavu za e-učenje - Merlin	-	70

1.13. Quality Assurance

The quality of studying is continuously monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An annual analysis of exam pass rates is conducted, and a student survey is carried out once per semester (attached with the faculty description). All data, including exams, written work, and grading, are at all times publicly available to all students enrolled in the course.

[1] **NOTE:** 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Robert Baždarić, Ph.D.		
Course	Automation of Ship's Propulsion		
Study Programme	Marine Engineering		
Type of Course	Mandatory		
Year of Study	2nd		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		45+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are the acquisition of knowledge in the field of automation, the principles of automatic control and regulation and the understanding of the operation of sensors, actuators and controllers with emphasis on their application to ship machinery and processes.

1.2. Prerequisites for Course Registration

There are no prerequisites.

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. Distinguish between the principles of automatic control and automatic regulation
2. Explain the basic requirements of automation
3. Calculate the transfer function for the control loop
4. Distinguish between different types of automation components and their basic characteristics
5. Apply standard techniques for adjusting the controllers
6. Calibrate the measurement sensors (temperature, pressure, level)
7. Explain the basic operating principles of the various controller designs
8. Define and describe the SARs of the ship's process, management and protection of the ship's propulsion systems.

1.4. Course Outline

Areas of automation, principles of automation formulations. The signaling. Energy transformations and sources in automation and factors for their selection. Definition of the transient and transfer function and principles of calculating the transfer function for various complex structures. Characteristics of automatic regulation, control and further automatic process control. Principles and techniques of automatic regulation. The structure of the automatic control system. Basic components of regulation and control systems (measuring elements, comparators, control units, actuators, ...). Calibration of sensors. Types of controllers. Classification of controllers. Signal transmitters, principles and schemes of pneumatic and hydraulic control. Systems for the regulation of ship processes, automatic remote control, control and protection of ship propulsion systems.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		
1.7. Student Obligations		
Attendance in the course, 1st colloquium, 2nd colloquium, laboratory exercises and final examination		
1.8. Assessment[1] of Learning Outcomes		

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam	1,05	Oral exam		Essay		Research	
Project		Continuous Assessment	1,75	Presentation		Practical work	0,7
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The students' obligations are: regular class attendance (a student may miss a maximum of 30% of classes), 1st and 2nd colloquium, laboratory exercises and final examination. The process of assessment of acquired learning outcomes is carried out in accordance with the Study Regulations of the University of Rijeka and the Study Regulations of the Faculty of Maritime Studies in Rijeka as follows:

- 70% of the acquired learning outcomes are assessed by continuous assessment of knowledge during lectures through the 1st colloquium, learning outcomes 1-4 (30%), the 2nd colloquium, learning outcomes 5-8 (30%), submission of laboratory exercises, learning outcomes 1-8 (10%)
- Depending on the student's success in continuous assessment, the student may acquire the right to be exempted from assessment in the examination.
- in the final part of the examination, 30% of the acquired learning outcomes (1-8) are assessed and the student must achieve at least 50% of the points to pass the final examination.

Examples of the assessment of defined learning outcomes are:

1. Draw a block diagram of the control loop, mark the main components, the specific control blocks and the variables.
2. When and how is the PD controller used?
3. Calculate the transfer function for the given control loop.
4. Explain the operating principle and the properties of electromagnetic actuators.
5. Describe the setting parameters of the PID controller and their adjustment (Ziegler-Nichols method).
6. Name the principle of calibrating pressure sensors.
7. Set up the pneumatic controller for operation with a nozzle screen amplifier.
8. Explain the basic structure and function of the servo system and the differences when using a processor-based controller.
9. How and through which measuring sensors can we obtain information about the rudder angle or the azimuth of the thruster?

1.10. Main Reading

1. V. Tomas, I. Šegulja, M. Valčić, Osnove automatizacije, Pomorski fakultet, Sveučilište u Rijeci, 2010.
2. E-course syllabus available on the e-learning system – Merlin *(https://moodle.srce.hr)*

1.11. Recommended Reading

1. T. Šurina, Automatska regulacija, Školska knjiga, Zagreb, 1987.
2. HRB- Pravila za tehnički nadzor pomorskih brodova, dio 13.-Automatizacija, Hrvatski registar brodova, Split

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Tomas, I. Šegulja, M. Valčić, Osnove automatizacije, Pomorski fakultet, Sveučilište u Rijeci, 2010	10	60
E-course syllabus available on the e-learning system Merlin *(https://moodle.srce.hr)*	NA	60

1.13. Quality Assurance

Quality assurance is based on the faculty's ISO 9001 system. Annual analyses are carried out on the basis of the students' examination results, and a survey is conducted among the students at the end of each semester, anonimus.

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Course description

Generic information			
Head of Course	Mirjana Borucinsky, PhD		
Course	English Language III		
Study Programme	Marine Engineering		
Type of Course	Core		
Year of Study	2	Semester	3
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		15+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to develop the students' ability for written and oral communication in English language using the basic terminology related to the basic parts of the engine and their functions.

1.2. Prerequisites for Course Registration

Successful completion of *English language 2.*

1.3. Expected Learning Outcomes

The students are expected to be able to:

1. Recognize and describe the basic parts of the main engine using specialized terminology.
2. Demonstrate language skills in describing the function of the engine parts.
3. Anticipate possible malfunctions and difficulties in the operation of the main engine parts and discuss them in English.
4. Interpret the instructions provided in the instruction manuals in English.
5. Connect simple lexical and syntactic units into complex units.

1.4. Course Outline

Cylinder crankcase, Crankshaft, main bearings and shaft, Service instruction, Connecting rod, Cylinder liners, Pistons, Cylinder head and valves, Inlet and exhaust valves, Relative/Adjectival clauses, Result clauses, Means or agent, Time clauses, Nominal compounds.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments

1.7. Student Obligations

Class attendance, activities, continuous assessment and final exam (written and oral)

1.8. Assessment[1] of Learning Outcomes

Course	1,5	Class participation		Seminar paper		Experiment	

[1] **NOTE:** 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. Use empty fields for additional activities.

attendance							
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio		Final exam	0,5				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70 % in class, 30 % at the final exam (outcomes 1-5).
1st mid-term exam (30 %) for outcomes 1, 2
2nd mid-term exam (30 %) for outcomes 3 - 5
Activity in class (doing exercises in the learning platform Merlin) (10 %)
Final oral exam (30 %) (outcomes 1-5)

Examples of assessment for each outcome in mid-term exams:
1. Describe engine parts on the picture using specialized terminology.
2. Provide a presentation in English of engine parts and their functions.
3. Anticipate possible malfunctions and difficulties in the operation of main engine parts and explain them in English.
4. Rephrase the instructions from the instruction manuals written in English.
5. Connect simple lexical and syntactic units into complex units

Examples of assessment for each outcome in the final exam:
1. Mark and provide English terms for parts of the engine on the picture.
2. Describe and present engine parts and their functions in English.
3. Anticipate possible malfunctions and difficulties in the operation of main engine parts.

Outcomes 4 and 5 are assessed indirectly through the outcomes 1-3.

1.1. Main Reading

Spinčić, A.-Pritchard, B.: An English Textbook for Marine Engineers II, Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.

1.2. Recommended Reading

- marinediesels.co.uk (The Learning Resources for Marine Engineers, Warsash Maritime Academy, UK)
moodle.srce.hr

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Spinčić, A.-Pritchard, B.: *An English Textbook for Marine Engineers* II, Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.	30	70

1.4. Quality Assurance

The quality of the course is monitored in accordance with the ISO 9001 system and the European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the course are analyzed and appropriate measures implemented accordingly.

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3.2. Course description

Generic information			
Head of Course	**Radoslav Radonja, Ph. D., associate professor**		
Course	**Machinery Control and Crew Management**		
Study Programme	**Marine Engineering**		
Level	**Undergraduate**		
Type of Course	**STCW - obligatory**		
Year of Study	**2**		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		**4**
	Number of Hours (L+E+S)		**45 + 0 + 0**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to acquire knowledge about the principles and laws of machinery control, crew management and Watchkeeping on board, and especially the part related to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) and the International Safety Management Code (ISM Code) pursuant to A-III-1/2 of the STCW Convention.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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After passing the exam, students will be able to:

1. Interpret the basic concepts of Engine room management (management, supervision, control, decision-making, decision-making in risk situations, correct prioritization) and shipboard crew management (assignment of crew and duties, assignment of tasks, effective communication, assertiveness, awareness of the situation and respect team experience)
2. Explain the concept of Watchkeeping, organization of Engine Watchkeeping, taking over, holding and handing over of the Engine Watch on board
3. State and explain the actions of the Watchkeeping Engineer in special circumstances and emergencies
4. Interpret the requirements of the ISM and ISPS codes and the impact of the human factor on their application
5. State and explain the legislative requirements and documentation on board related to Engine room management and crew management (Engine logbook, technical documentation, checklists, working permits, etc.)
6. Explain the method of calculating risk factors and analyse various events with regard to harm or danger
7. State and explain the basic principles of good management, shipboard organization and crew health care
8. Analyze the work performance of the crew member, the role in the team and their contribution to the overall work in the engine room and on board (maintenance of the plant, participation in exercises, participation in joint operations, etc.)
9. Explain how to prepare and conduct ship meetings and write reports
10. State and explain teaching and training methods and requirements with regard to emergency drills, testing and maintenance of emergency equipment and facilities.

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1.4. Course Outline

Definition of management, decision making and control in management, management in a risk situation, places of Engine control. Watchkeeping: the formation of the Watch, travel planning, taking over, performing and handing over the Watch, keeping the Watch in extraordinary circumstances. ISM code (safe management system on board - SMS), crew health and safety, proper safety and risk assessment, ISPS code, safety cases and elements, human factors, work permit system, safe management elements and hazard identification. Principles of crew management, crew attitudes, group behavior, employment conditions. Crew organization: scheduling, work analysis, distribution of duties, organization in case of safety and emergency, crew duties and communication, management of ship administration, meeting technique. Exercise methods and emergency exercises on board. MLC and ILO conventions.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☒ Multimedia and Network
	☐ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____
1.6. Comments		

1.7. Student Obligations

Active class attendance, 1st colloquium, 2nd colloquium and final oral exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,0	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place in accordance with University's and Faculty's normative acts as follows:

- through continuous testing of knowledge during classes, 70% of the acquired learning outcomes are evaluated through the 1st colloquium - learning outcomes 1-3 (30%), 2nd colloquium - learning outcomes 4-10 (40%), while the student must realize a minimum of each colloquium 50% points
- at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-10), and the student must realize a minimum of 50% of points in order to pass the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Explain the concept of engine control (regulation)? Explain the difference between the term 'data' and the term 'information' in control terms? What are the types of management control? State and explain the human reaction to control? List and explain at least two difficulties that may arise on board when making decisions in a risk situation? ...
2. What does the term Engineering Watch mean and what factors influence its structure? Who is responsible for setting up a Watch on the ship and in the engine room? In which cases may a Watch engineer/Officer not hand over the Watch to the Engineer/Officer replacing him? ...
3. List and explain the features of performing Engineering Watch in special circumstances and emergencies? In which cases must the Engineer on duty immediately inform the Chief Engineer? List and explain the features of the collaboration between the Engine officer on duty and the staff working on preventive maintenance in the Engine room? ...
4. State and explain the objectives of the ISM Code / (ISPS Code…)? State and explain the influence of the human factor in the implementation of code requirements?
5. Who is in charge of entering data in the Engine Logbook and what data is entered? For which works in the Engine room must a 'Hot Work Permit' be obtained? Who conducts the verification process and signs the 'Entry into Enclosed Space Permit'? What should a person who is in charge of being at the entrance of an enclosed space have to do at least if he notices that the person in the enclosed space has lost consciousness? ...
6. Explain how the risk assessment for certain events is approached and how the risk factor is calculated?
7. List and explain at least three principles of good leadership? What factors can influence crew attitudes and their performance? Explain the concept of 'Safety working practice' and requirements regarding the use of protective work equipment and resources?
8. List and explain at least two elements that include the analysis of the work of the crew on board? Explain why a response such as "I did not receive a report …" or "I did not say because no one asked me …" is considered completely unacceptable in terms of good communication?
9. Explain the basic elements that must be included in the preparation of the meeting? In what ways can a meeting be held? Who should be involved? How is the agenda prepared? How appropriate is the duration of the meeting? How can disagreements be resolved during the meeting? Who keeps the minutes and writes the report of the meeting? How is the conclusion made and what about those points about which it could not be made? What to do in cases where some participants do not agree with the conclusions of the meeting? ...
10. Explain what is the purpose of conducting exercises/drills/trainings on board? What is the name and where should be placed the list of emergency crew responsibilities, what is a 'Personal emergency responsibility card' and where it should be located? How often do exercises have to be conducted on board? Give some examples of exercises on board and explain how they are carried out? What emergency devices do Engine officers check every Saturday? Which devices in the lifeboat are regularly checked by Engine officers? Explain the term 'quick-closing valves' what are they for and where is the place of activation? If a CO2 engine fire extinguishing system is used on board, where it should be located, how can it be activated and what should be done before activating it? …

1.10. Main Reading

1. Teacher lectures - available in electronic form
2. STCW Convention, (2010),
3. SOLAS (ISM Code / ISPS Code)

1.11. Recommended Reading

1. Code of Safe Working Practices for Merchant Seamen, The Stationery Office Publications Center, London, 1998 - available in electronic form

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
1-3 (electronic form)	unlimited	90

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

[1] **NOTE:** 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Predrag Kralj, PhD		
Course	Fuels, Lubricants and Water (116506)		
Study Programme	Marine Engineering		
Type of Course	Compulsory		
Year of Study	II		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30 + 0 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Understanding fuel, lubricants and water features and their application on board.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

After passing the exam students will be able to:
1. Define the liquid and gas fuels use on board
2. Explain the basic crude oil refining processes.
3. Explain the classification of liquid and gaseous fuels, their composition, structure and properties.
4. Explain and analyses engine faults due to inadequate lubricants and fuels
5. Explain and define the combustion process.
6. Analyse and explain the fuel system on board.
7. Explain the importance of lubrication and methods of lubricants production
8. Explain properties of lubricants.
9. Analyse lubricants on board
10. Explain the use of water on board, the physical and chemical properties of water and problems with

1.4. Course Outline

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Crude oil, the basics of crude oil processing. Liquid fuels and gaseous fuels. Properties and application of Marine diesel, heavy and residual fuels; Marine fuels properties for gas turbines. Fuel oil combustion process. Marine fuel quality and heavy fuel combustion problems. Liquid fuel and lubricating oil treatment and cleaning. Marine fuel quality standards and comparison with other fuels. Using poor quality fuels in diesel engines. Fuel and lubricants additive. Lubricant properties. Lubricant classifications and specifications. Type of lubricant for marine use. System oils and their specificities. Lubrication of marine engine cylinders. Lubrication of thermal turbines, compressors, and other machines; conditions and requirements. Handling lubricants (oils and greases), disposal of waste lubricants. Oil quality control, in-service oil treatment, lubricant oil replacement recommendations. Use of water on board, physical and chemical properties of water. Water treatment and problems related to inadequate water.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

In addition to the compulsory lectures, the student is obliged to pass the exams and pass the final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,5	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Procedure for evaluating acquired learning outcomes: - The final grade in the subject is the sum of the points that the student has achieved during the course (70% of the grade) and the points earned on the final exam (30% of the grade) according to the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka. - Continuous assessment: two colloquiums - a minimum of 50% of the estimated number of points is required - Final exam: At the final exam (oral exam) the knowledge in the field of Fuels, Lubricants and Water is checked - a minimum of 50% of points is required.

Examples of evaluation by individual outcome at the colloquiums and final exam:
1. Boiler water quality assessment and feed water treatment
2. Comparison properties of Liquefied Natural gas, liquid fuel oil, LPG, methanol
3. Lubricating oil analysis, properties and consequences of poor lubricants quality

1.10. Main Reading

E. Tireli; Goriva i njihova primjena na brodu, knjiga, Pomorski fakultet u Rijeci
E. Tireli; Maziva i njihova primjena na brodu, knjiga, Pomorski fakultet u Rijeci
E. Tireli; Voda i njezina primjena na brodu, skripta, Pomorski fakultet u Rijeci
Lectures and presentations

1.11. Recommended Reading

Voda i brod, Vojtjeh Bačić, VPŠ, 1975

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
E. Tireli; Goriva i njihova primjena na brodu, knjiga, Pomorski fakultet u Rijeci	15	45
E. Tireli; Maziva i njihova primjena na brodu, knjiga, Pomorski fakultet u Rijeci	15	45
E. Tireli; Voda i njezina primjena na brodu, skripta, Pomorski fakultet u Rijeci	15	45

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	Dr.sc. Dean Bernečić, full professor	
Course	Marine Steam Generators (MSG)	
Study Programme	Marine engineering	
Level	Undergraduate	
Type of Course	Obligatory	
Year of Study	2	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Introducing students to the basic thermodynamic laws of operation of a steam generator, their construction and exploitation onboard the ship. Understanding fault diagnostics and cost-effective exploitation. Understanding the monitoring of the main parameters on a steam system

1.2. Prerequisites for Course Registration

Completed course "Thermodynamics and heat transfer"

1.3. Expected Learning Outcomes

It is expected that students will be able to:
1. Describe the purpose, types and main characteristics of marine steam boilers.
2. Explain the thermodynamic process in the steam generator, heat transfer and changes in the state of the individual parts of the steam generator.
3. Define and explain combustion, combustion products, control of combustion process.
4. Define and explain the steam generator heat balance, heat losses, utilization, fuel consumption.
5. Describe and explain air and exhaust gas circulation, water circulation, steam separation, fuel and feed water supply system.
6. Define materials for making pressure parts.
7. Describe and explain the system of regulation and steam generator safety system and parts.
8. Distinguish and compare the main types of marine steam generators.
9. Start boiler on the simulator and explain steam distribution the basics of maintenance, inspections and conservation.

1.4. Course Outline

Marine steam generators development, purpose, classification, main characteristics. Heat balance, heat losses, efficiency. Air and flue gas circulation: natural, forced. Water circulation: natural, forced. Steam separation. Fuel system. Water supply system. Materials for the manufacture of pressure parts, basic properties, classification regulations. Thermal expansion and their compensation. Regulation. Equipment and fittings, safety devices. Special designs of marine boilers. Exhaust gas boilers (utilizers). Boilers automation. Operation and maintenance, water analysis and treatment, inspections, pressure parts damage, conservation.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

In addition to the required lectures and exercises, before the final exam, the student takes 2 partial exams and a test on the engine room simulator.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	0,5
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% in class and partial exams, 30% in final exam; according to the University of Rijeka Study Regulations and the Study Regulations at the Faculty of Maritime Studies in Rijeka (Outcomes 1 - 9).
Partial exam 1 (I1 - I6, I8)
Partial exam 2 (I3, I5, I7)
Simulator operation (I9)
Simulation check example: Correctly prepare and start boiler, know how to read parameters during operation (I5, I7, I8, I9).
Example of a test question: Explain three-component feed water regulation, recognize sensors and explain their role (I7),
Simulator evaluation: Percentages assigned according to the checklist with regard to correct and incorrect procedures during operation.

1.10. Main Reading

Z. Prelec: Brodski generatori pare, Školska knjiga, Zagreb,1990.
Readings on web page: https://www.pfri.uniri.hr/web/hr/zavod_BS.php?pregled&id_username=10

1.11. Recommended Reading

J.H. Milton, *Marine Steam Boilers*, Newnes - Butterworths, 1980.
G.T.H. Flanagan, *Marine Boilers*, Kandy Marine Engineering Series, 1974.
Bernečić, Dean ; Orović, Josip; „Analiza isplativosti ugradnje turbogeneratora na brod“, Pomorstvo, 2011.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Z. Prelec: Brodski generatori pare, Školska knjiga, Zagreb,1990.	Library – 7 Book store - 0	70

1.13. Quality Assurance

[1] NOTE: 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. Use empty fields for additional activities.

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The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information			
Head of Course	Dean Bernečić, PhD		
Course	Marine Heat Turbines (116508)		
Study Programme	Marine Engineering		
Type of Course	Compulsory		
Year of Study	II		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30 + 15 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The course aim is to familiar students with the operation principles of steam and gas turbines, their application and operation in the ship's propulsion, importance of proper monitoring parameters in turbine operation.

1.2. Prerequisites for Course Registration

Completed course - Thermodynamics and heat transfer

1.3. Expected Learning Outcomes

After passing the exam istudents will be able to:
1. Explain the purpose, classification and main characteristics of marine heat turbines.
2. Explain the thermal processes of steam turbines
3. Define and analyze types of steam turbines, steam flow in the turbine, operation turbine optimizing.
4. Explain the performances of marine steam turbines.
5. Identify and explain the components of the steam turbine, the heating and degassing system of the water, the lubricating oil system.
6. Analyze and explain the system of regulation and protection of the steam and gas turbine.
7. Explain and analyze thermal processes in gas turbines.
8. Identify and explain the main parts of gas turbine and combined gas and steam turbine plants.
9. Plan and analyze heat turbine preparation, maintenance, inspection and operation of plant in operation.
10. Analyze failures in thermal turbines

1.4. Course Outline

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Comparison of propulsion machines: diesel engines, steam turbines, gas turbines. Types of steam turbines, steam flow in the turbine, optimizing turbine operation. Energy losses inside the steam turbine. Marine steam and gas turbine design. Steam turbine plant and control system. Gas turbines; open gas turbine process, two stage expansion, two-stage compression and expansion. Main parts of gas turbine plant. Combined gas and steam turbine plants. Plant in operation. Turbine and condenser failures.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

In addition to the obligatory lectures and exercises, the student is obliged to pass the examinations and pass the final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Procedure for evaluating acquired learning outcomes: - The final grade in the subject is the sum of the points that the student has achieved during the course (70% of the grade) and the points earned on the final exam (30% of the grade) according to the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka. - Continuous assessment: two colloquiums - a minimum of 50% of the estimated number of points is required - Final exam: The final exam (oral exam) checks the completeness of knowledge in the field of Marine heat turbines - a minimum of 50% of points is required.

Examples of evaluation by individual outcome at the colloquiums and final exam:
1. In the schematic diagram of the ship's heat turbine, identify the function of each element
2. On the basis of the operating parameters diagnose the fault and perform proper system regulation
3. Critically evaluate the local and remote indication of measured parameters

1.10. Main Reading

E. Tireli, D.Martinović: Brodske toplinske turbine, Pomorski fakultet u Rijeci, 2000.
Presentations from lectures and exercises

1.11. Recommended Reading

S.C. McBirnie, W.J. Fox; Marine Steam Engines and Turbines, Newnes-Butterworths
Woodward; Marine Gas Turbines

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
E. Tireli, D.Martinović: Brodske toplinske turbine, Pomorski fakultet u Rijeci, 2000.	25	45

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	Dr.sc. Dean Bernečić, full professor	
Course	Marine Engines (ME)	
Study Programme	Marine engineering	
Level	Undergraduate	
Type of Course	Elective	
Year of Study	2	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	7
	Number of Hours (L+E+S)	60+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Introducing students to the basic operation principles of internal combustion engines (ICE), their exploitation in operation, the economy of operation through proper monitoring of combustion, and the maintenance of diesel engine systems on board the ships.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

After passing the exam, the student will be able to:
1. Explain the types, basic laws, operating principles and differences of ICE,
2. Describe and compare various ways of changing the working medium in ICE,
3. Describe and compare ways of scavenging and charging on ICE,
4. Show and explain the roles of the main parts of ICE,
5. Recognize and explain vibrations in ICE,
6. Describe the main systems and explain the main procedures and measurements in ICE.

1.4. Course Outline

Basic concepts. Reciprocating piston mechanism. Thermal processes. Engine power. Mean effective pressure. Efficiency. Moving and fixed engine parts. Kinematics and dynamics of the piston mechanism. Engine scavenging and charging. Turbochargers. Exchange of working medium. External and internal mixture formation. External characteristics of the engine and the propeller. Fuels and lubricants. Engine maintenance. Measurements and adjustments.

1.5. Modes of Instruction

☒ Lectures	☐ Practical work
☐ Seminars and workshops	☐ Multimedia and Network
☒ Exercises	☐ Laboratory
☐ E-learning	☐ Mentorship
☒ Field work	☐ Other _____

1.6. Comments

1.7. Student Obligations

Mandatory class attendance (at least 70%).

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	4	Presentation		Practical work	
Portfolio		Final exam	0,5				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% in class, 30% in the final exam; according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka.
Preliminary exam 1 (I1, I2, I3, I5)
Preliminary exam 2 (I4, I5, I6)
Final exam (I1 to I6)
Example of exam question:
Mark and describe main points in the pV diagram (I1, I2),
Describe the operation of a turbo charger (I2, I3),
Recognize torsional vibrations and vibrations of the 1st and 2nd order (I5).

1.10. Main Reading

1. Mikuličić : Motori I, Školska knjiga, Zagreb, 1976;
2. Krpan: Prednabijanje motora, Laki motori I i II, Sveučilišna naklada Liber, Zagreb, 1976;
3. Parat: Brodski motori s unutarnjim izgaranjem, Sveučilište u Zagrebu, 1990.

1.11. Recommended Reading

1. Kees Kuiken: Diesel engines 1, 2, 3
2. Bernečić, Dean; Šegulja, Ivica; „Analiza utjecaja prijelaza topline na tlak izgaranja u dvotaktnom sporookretnom brodskom dizelskom motoru“, Pomorstvo 2013.
3. Dujmović, Josip; Bernečić, Dean; „Deviations and errors review on measuring and calculating heavy fuel oil consumption and fuel stock onboard vessels equipped with volumetric fuel consumption flowmeters, Pomorstvo, 2021.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Parat: Brodski motori s unutarnjim izgaranjem, Sveučilište u Zagrebu, 1990.	Library 5	20

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

[1] NOTE: 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Vladimir Pelić, PhD		
Course	Marine auxiliary engines and equipment		
Study Programme	Marine Engineering		
Type of Course	Obligatory		
Year of Study	2.		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		60 + 15 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to introduce students to ship's auxiliary machinery and devices, their most common designs, operating methods, operational characteristics, and all other factors necessary for management and decision-making in the ship's machinery complex.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

After listening and passing the course, students will be able to:
1. Describe and explain the performance, construction and mode of operation of individual elements of the shaft line (shaft line).
2. Describe and explain the designs, construction and operation of individual versions of ship pumps. Analyze individual types of drives and the possibility of regulating pump supply.
3. Analyze the main features of ship compressors and fans. Describe and explain the designs, construction and operation of individual versions of ship compressors and fans.
4. Describe and explain the designs, construction and operation of individual versions of ship filters.
5. Describe and explain the construction and operation of various versions of steering gears.
6. Describe and explain the construction features and sizes necessary for the calculation and selection of heat exchangers.
7. Describe and explain the principle of operation of centrifugal separators.
8. Describe and explain the principle of operation of mooring, anchor and cargo winches.

1.4. Course Outline

Introduction. Shaft line, intermediate shaft, propeller shaft, thrust bearing, shaft connection.
Stern tube and seals, bearings, transmissions and couplings, propeller.
Marine pumps, introduction, classification. Pump drive and regulation, application of pumps on ships, special requirements.
Energy conversion. Pump delivery head, power and efficiency, suction head, cavitation.
Centrifugal pumps. Piston and reciprocating pumps. Rotary volumetric pumps - screw, gear, vane.
Compressors and fans. Compressor process, multistage compressors, compressor parts.
Compressor operation, condensate and oil separation and malfunctions during operation.
Filters. General information on the application of filters and filtration materials. Simple, reversible and self-cleaning filters.
Steering gears - introduction. Steering system. Steering gear designs and operating principle.
Heat exchangers. Application of heat exchangers on board ships. Classification, selection and design features of heat exchangers. Fundamentals of heat exchanger calculation.
Centrifugal separators.
Deck machinery (winches and cranes)

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular attendance of classes (at least 70%).

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,5	Essay		Research	
Project		Continuous Assessment	2,0	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Procedure for evaluating acquired learning outcomes:

- The final grade for the course is the sum of the points that the student achieved during classes (70% of the grade) and the points achieved in the final exam (30% of the grade) according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka.
- Continuous assessment of knowledge:

Condition for taking midterm exams – attendance at classes.
It is necessary to achieve a minimum of 50% of the total points in each of the partial exams.
Partial exam 1 (outcomes 1 and 2)
Partial exam 2 (outcomes 3, 4, 5 and 6)
Partial exam 3 (outcomes 7 and 8)

- Final exam:

The final exam (oral exam) tests the completeness of knowledge (learning outcomes 1-8).

Examples of evaluation of learning outcomes in relation to the set learning outcomes are:

1. Show a shaft line with a sketch and indicate all parts of the shaft line. (outcome 1)
2. Show and explain the parallel and series connection of two centrifugal pumps with the same characteristics. (outcome 2)
3. Show a two-stage compressor with a sketch and explain the reasons for using multi-stage compression (outcome 3)
4. Define the main parts of an automatic fuel or oil filter in the shown figure and explain the principle of operation (outcome 4)
5. Sketch and explain the scheme of an electro-hydraulic steering gear. (outcome 5)
6. Show a tube or plate heat exchanger with a sketch. Analyze the main quantities required for the calculation and selection of a heat exchanger. (outcome 6)
7. Explain the principle of operation of a centrifugal separator (outcome 7)
8. Explain the principle of operation of an electro-hydraulic anchor winch (outcome 8)

1. V. Ozretić, Brodski pomoćni strojevi i uređaji, Split Ship Management, Ltd-Split, 2004.
2. Smith, D.W.: Marine auxiliary Machinery, Butterworths, London, 1983.
3. Teaching material - lecture presentations - available on the e-learning system – Merlin

1.11. Recommended Reading

1. M. Mikuličić, Brodski pomoćni uređaji i strojevi;
2. D. Bošković, Brodske pomoćne mašine

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
V. Ozretić, *Brodski pomoćni strojevi i uređaji,* Split Ship Management, Ltd-Split, 2004.	10	70
D.W. Smith, *Marine auxiliary Machinery*, Butterworths, London, 1983.	5	70
References (1.10. (3)) available in electronic form.	-	70

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

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NCourse description

Generic information			
Head of Course	Jana Kegalj, PhD		
Course	English Language IV		
Study Programme	Marine Engineering		
Level	Bachelor		
Year of Study	2	Semester	4
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		15+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to develop the students' ability for written and oral communication in English language using the basic terminology related to the ship systems and machinery.

1.2. Prerequisites for Course Registration

Successful completion of *English language 3.*

1.3. Expected Learning Outcomes

The students are expected to be able to:

1. Recognize and describe the parts of the fuel system, lub oil system, starting air system, cooling system using specialized terminology.
2. List possible failures and damages on the systems and suggest possible solutions using proper terminology in English.
3. Translate specialized texts from instruction manuals and ship engineering books from English into Croatian.
4. Connect simple lexical and syntactic units and sentences into complex.

1.4. Course Outline

Valve operating gear, Fuel system, Fuel injection system, Air and exhaust systems, Turbochargers, Lubricating oil system, Water cooling system, Starting air system, Purpose clauses, Cause-result relationship.

1.5. Modes of Instruction		
	☐ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments

1.7. Student Obligations

Class attendance, activities, continuous assessment and final exam (written and oral)

1.8. Assessment[1] of Learning Outcomes

Course	1	Class participation		Seminar paper		Experiment	

[1] **NOTE:** 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. Use empty fields for additional activities.

attendance							
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	0,5	Presentation		Practical work	
Portfolio		Final exam	0,5				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70 % in class, 30 % at the final exam (outcomes 1-4).
1st mid-term exam (30 %) for outcomes 1, 2
2nd mid-term exam (30 %) for outcomes 3, 4
Activity in class (doing exercises in the learning platform Merlin) (10 %)
Final oral exam (30 %) (outcomes 1-4)

Examples of assessment for each outcome in mid-term exams:
1. Recognize on the picture and describe in English the parts on the fuel system, lub oil system, starting air system, cooling system.
2. List possible failures and damages on the systems and suggest a solution using causal, relative and passive clauses.
3. Translate in writing a specialized text from instruction manuals and ship engineering books from English into Croatian.
4. Connect simple lexical and syntactic units and sentences into complex.

Examples of assessment for each outcome in the final exam:
1. Recognize on the picture and describe in English the parts on the fuel system, lub oil system, starting air system, cooling system.
2. List possible failures and damages on the systems and suggest a solution using causal, relative and passive clauses.
3. Translate orally a specialized text from instruction manuals and ship engineering books from English into Croatian.
Outcomes 4 is assessed indirectly through the outcomes 2 and 3.

1.1. Main Reading

Spinčić, A.-Pritchard, B.: An English Textbook for Marine Engineers II, Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.

1.2. Recommended Reading

- marinediesels.co.uk (The Learning Resources for Marine Engineers, Warsash Maritime Academy, UK)
- Seagull training package

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Spinčić, A.-Pritchard, B.: *An English Textbook for Marine Engineers* II, Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.	30	70

1.4. Quality Assurance

The quality of the course is monitored in accordance with the ISO 9001 system and the European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the course are analyzed and appropriate measures implemented accordingly.

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3.2. Course description

Generic information			
Head of Course	**Radoslav Radonja, Ph. D., associate professor**		
Course	**Sea and Marine Environment Protection**		
Study Programme	**Marine Engineering**		
Level	**Undergraduate**		
Type of Course	**STCW - obligatory**		
Year of Study	**2**		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		**3**
	Number of Hours (L+E+S)		**30 + 0 + 0**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main goal of the course is to acquire knowledge about the principles and laws of environmental protection, and understanding of theoretical, technical and legislative considerations of the relationship between organisms, biotopes and sources of pollution in traffic, and especially the part related to marine environment.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

After passing the exam, students will be able to:
1. Interpret the basic concepts of ecology and sustainable development
2. Explain and interpret the harmful impact of pollutants in maritime transport on the biocenosis and biotope
3. List and explain the protocols and annexes of the MARPOL 73/78 Convention
4. Explain the categories of pollutants according to the annexes and their harmful impact
5. State and explain the legislative requirements and documentation on board related to pollution prevention
6. Argue the requirements of the Ballast Water Convention (BWC) and assess their impact on the environment
7. State and explain the harmful effects of underwater anti-fouling paints (AFC)
8. Analyse and compare sources of marine noise pollution
9. List the requirements of the Convention on the Recycling of the Ships and explain prudent disposal procedures
10. Discuss possible scenarios related to sustainable development and climate change.

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1.4. Course Outline

Basic concepts of ecology, sustainable development and sustainable maritime affairs. Pollutants and their harmful effects. Marine ecosystem factors and protection of the marine environment. Ship as a source of pollution. MARPOL 73/78 (protocols and annexes). Ballast Water Convention. Convention against anti-fouling paints. Ship Recycling Convention. Sound pollution. Assumed possible scenarios related to sustainable development and climate change.

1.5. Modes of Instruction	☒ **Lectures** ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Active class attendance, 1st colloquium, 2nd colloquium and final oral exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,0	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,0	Essay		Research	
Project		Continuous Assessment	1,0	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place in accordance with University's and Faculty's normative acts as follows:
• through continuous testing of knowledge during classes, 70% of the acquired learning outcomes are evaluated through the 1st colloquium - learning outcomes 1-2 (20%), 2nd colloquium - learning outcomes 3-6 (50%), and the student must realize each colloquium minimum 50% points;
• At the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-10), whereby the student must realize a minimum of 50% of points in order to pass the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Explain what studies ecology as a science? What is the difference between abiotic and biotic factors? Why is water said to be the most important abiotic factor? Explain the concept of sustainable development and sustainable maritime affairs?
2. What is meant by the term "oil on board" and what does the spread and movement of the oil spill on the water depend on? List and explain the basic processes of oil decomposition? What are the harmful effects of pollutants from the exhaust gases of marine energy systems on the environment, and what on human health and why? ...
3. What does the MARPOL 73/78 Convention consist of and what does Annex 1 (or 2 or 3 or… 6) deal with? To which ships does it apply / does it not apply? What are the exceptions? What are special and what are particularly sensitive marine areas? ...
4. According to Annex 2 of MARPOL 73/78 of the Convention, where are unhealthy substances in bulk listed and how are they classified? According to Annex 3 of the MARPOL 73/78 Convention, where are dangerous substances listed and how are they classified? ...
5. According to Annex 5 of the MARPOL Convention, what documentation must a ship have? According to Annex 3 of MARPOL 73/78 of the Convention, what are the conditions of packing and marking of cargo, requirements for accompanying documentation, packing and labeling, and how to handle empty packing? ...
6. What is the potential danger from ballast water to the environment coming from a tanker unloading / loading cargo at the tanker terminal and why? What is the difference between clean and separate ballast on an oil tanker? ...
7. What impact on the ship comes from the accumulation of fouling on the hull? What environmental hazards come from TBT underwater anti-fouling paints? ...
8. How does marine noise pollution affect the environment and people? What are the possible sources of noise and what is the difference between land and sea noise pollution? ...
9. Explain the term so-called. "Green passports" on board? Explain the difference in costs and the impact on people and the environment between ship recycling by stranding and recycling in a recycling shipyard? ...
10. What are the causes that can lead to the opening of the so-called northern sailing routes and what are the possible consequences? How can a further increase in atmospheric temperature affect 'permafrost' and what are the possible consequences? Why is a ship considered the most environmentally friendly means of transport despite being heavily polluted? ...

1.10. Main Reading

1. Teacher lectures - available in electronic form
2. Klepac, R.: Osnove ekologije, JUMENA, Zagreb 1990.
3. IMO, MARPOL 73/78., Consolidated Edition, London 2013.

1.11. Recommended Reading

1. https://www.pfri.hr/web/dokumenti/uploads_nastava/20180227_184357_zec_ZMMO_v.1.5_web.pdf
2. Golubić, J. Promet i okoliš, Fakultet prometnih znanosti u Zagrebu, Zagreb, 1999.
3. Dorčić, I.: Osnove čišćenja uljnih zagađenja, SKTH, Zagreb
4. Botkin, D., Keller, E., Environmental science, J. Wiley & sons, Inc., New York, 1995.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teacher lectures - available in electronic form	-	60
IMO, MARPOL 73/78., Consolidated Edition, London 2013.	1	60
Klepac, R.: Osnove ekologije, JUMENA, Zagreb 1990.	1	60

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

[1] **NOTE:** 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Lovro Maglić, Ph.D.		
Course	Safety at sea		
Study Programme	Marine Engineering		
Type of Course	Mandatory		
Year of Study	2		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		45+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to familiarize students with the international navigation safety system, including the most important maritime conventions, and to train them to independently perform basic maritime safety tasks, including search and rescue at sea, emergency communications, survival at sea and firefighting, in accordance with the provisions of the STCW Convention. Through practical work on the exercises, students should acquire skills in case of emergency situations, especially fire on board, abandoning ship, survival at sea and communication within the GMDSS system.

1.2. Prerequisites for Course Registration

Students who have not graduated from nautical maritime schools are required to attend and successfully complete the Introductory Differentiation Program (D2 - Special Program of Basic Shipboard Safety).

1.3. Expected Learning Outcomes

After learning, the student will be able to:

1. enumerate and interpret the legal sources of the international and national safety and security system,
2. present the basic actions and procedures in search and rescue at sea,
3. interpret and distinguish between means of communication in distress,
4. describe the procedure for abandoning the ship with dedicated life-saving appliances,
5. analyze and differentiate the procedures after abandoning ship in different situations,
6. explain the functional properties, technological conditions and maintenance of fire-fighting equipment on ships.

1.4. Course Outline

International and national safety system, search and rescue at sea, maritime incidents, rescue equipment, communications during emergency situations, abandoning ship and survival at sea, man overboard, fire protection, maintenance and supervision of all safety systems on board, development and preparation of emergency plans and organization and conduct of drills on board.

1.5. Modes of Instruction		
	☒ Lectures	☒ Practical work
	☐ Seminars and workshops	☒ Multimedia and Network
	☒ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments	Part of the exercises related to procedures in emergency situations are performed on the designated practicums: shore-based davits - lowering the lifeboat into the sea; and firefighting training area - fire extinguishing techniques.

1.7. Student Obligations

The condition for taking the final oral exam is a successfully passed written exam.
The final exam tests the completeness of theoretical knowledge in the field of safety at sea.
The method of student assessment is:
- Passing the written exam: 50% of the grade points
- Final Oral Exam: 50% of grade points.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam	1	Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

1. Written exam in the field of the international system of maritime safety, search and rescue at sea, maritime incidents, lifesaving appliances, communication during emergency situations, abandoning ship, survival at sea and fire protection (it is necessary to achieve a minimum of 50% correct answers, all learning outcomes)
2. Oral exam - the completeness of theoretical knowledge in the field of safety at sea is checked (it is necessary to achieve a minimum of 50% of the required theoretical knowledge)

Examples of evaluation of learning outcomes in relation to set learning outcomes are:
1. Describe the content of the chapters of the SOLAS Convention. (1)
2. Sort out the ways in which people are assisted at sea by type of threat. (2)
3. Describe the application of different search patterns at sea. (3)
4. Specify the means of maritime communication for making distress calls. (4)
5. Explain the procedure for abandoning ship. (5)
6. List and explain how the ship's fire protection systems work. (6)

1.10. Main Reading

Teaching material available on the e-learning system - Merlin (https://moodle.srce.hr)

1.11. Recommended Reading

1. International Maritime Organization, SOLAS, London, 2020.
2. International Maritime Organization, SAR, London, 2003.
3. International Maritime Organization, IAMSAR, Vol. 1, Vol. 2, Vol. 3, 2016.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching material available on the e-learning system - Merlin (https://moodle.srce.hr)	Unlimited	

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the failure to pass are analysed and appropriate measures are adopted.

[1] **NOTE:** 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Assoc. Prof. Tatjana Čulina, MD, PhD		
Course	Maritime Medicine		
Study Programme	Marine Engineering		
Type of Course	Mandatory		
Year of Study	2nd Year		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		**(L+E+S):** 30 + 15 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

To train students in independently providing urgent medical assistance and, using manuals and telemedical consultation, to stabilize and care for a patient until optimal health is restored or higher-level medical care becomes available, in accordance with the STCW Convention.

1.2. Prerequisites for Course Registration

Enrollment prerequisite: Bridging Training Program: Competence in providing medical first aid.

1.3. Expected Learning Outcomes

Upon completing and passing the course, students will be able to:

1. Describe the duties and responsibilities of a certified ship officer during open-sea navigation and explain their application in various situations.
2. Apply appropriate medical aid procedures and perform procedures related to health and life safety at sea.
3. Demonstrate general competencies in providing first aid and carry out emergency medical procedures under maritime navigation conditions.
4. Interpret telemedical advice from shore and plan activities in accordance with the given instructions.

1.4. Course Outline

Recognizing emergencies. Assessment of the injured and ill. Application of appropriate procedures in life-threatening situations. Stabilizing and maintaining a critically ill patient. Exchange of medical information (Radio Medico). Primary healthcare of a patient aimed at stabilizing their condition or restoring optimal health using telemedical procedures and appropriate manuals. Use of maritime medical manuals.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Active participation in classes and at least 70% attendance.
Demonstrate a minimum of 60% of required knowledge during continuous assessment through mid-term exams. Two mid-terms will be conducted. A maximum of 50 points can be achieved in the mid-terms, with a minimum of 30 points required to pass. In the final exam, during assessment of theoretical knowledge and practical skills by demonstrating a medical technique, at least 50% of knowledge must be demonstrated.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	0,5	Oral exam	0,5	Essay		Research	
Project		Continuous Assessment	0,5	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% during classes and 30% in the final exam (according to the University of Rijeka Study Regulations and the Maritime Faculty Study Regulations).
Continuous assessment: Mid-term exams covering practical knowledge from course content — a minimum of 60% knowledge is required. Two mid-terms will be conducted. A maximum of 50 points can be achieved, with a minimum of 30 points required to pass.
Final exam:
The final exam tests the comprehensiveness of theoretical knowledge, both in the theoretical part and practical skills — a minimum of 50% knowledge is required.

1.10. Main Reading

- Mulić R., Ropac D.: *Medicina za pomorce (Medicine for Seafarers)*, Medicinska naklada, Zagreb, 2002.
- Soldo I., Sesar Ž.: *Zdravstveni savjeti za pomorce (Health Advice for Seafarers)*, Naklada Zadro, Zagreb, 1999.
- Teaching materials available via the Merlin e-learning platform (https://moodle.srce.hr)

1.11. Recommended Reading

Vuksanović P.: *Zdravstvena zaštita na brodu (Healthcare on Board)*, Medical Institute Kotor, 1996.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Medicine for Seafarers	20	80
Competence in Providing Medical Care on Board (authorized lectures)	20	
Health Advice for Seafarers	20	

1.13. Quality Assurance

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3.2. Course description

Generic information			
Head of Course	Predrag Kralj, Professor, Ph.D., MS.ME., BS.ME.		
Course	Marine Auxiliary Systems		
Study Programme	Marine Engineering		
Type of Course	Obligatory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		60+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to introduce students to the field of ship auxiliary systems, their most common types, the characteristics of their important elements and the use of the systems in a safe and efficient mode, which is necessary for a responsible ship engineer.

1.2. Prerequisites for Course Registration

Knowledge gained through Technical mechanics I and II and Thermodynamics and heat transfer courses and exams.

1.3. Expected Learning Outcomes

It is expected that the students will be able:

1. To recognize, define and give examples of new trends in technology and recent developments in marine engineering, e.g. changes in propulsion systems regarding recent development of marine diesel engines, development of diesel engines' cooling systems through history etc.
2. To know marine engineering terminology, both Croatian and English
3. To demonstrate the skills of simple calculation – how to calculate and dimension system element (segments / parts)
4. To analyse the type of ship piping element and to draw most common elements
5. To explain graphic interpretation of the system and its function
6. To plan maintenance works in the engine room and perform engineer officer duties in a safe manner on both operation and management level
7. To establish the relations among measured parameters, the measuring points in the system and the alarms and their characteristics, the importance of alarms and, to give fault diagnosis, i. e. the cause of the alarms or faults
8. To create functional piping scheme in accordance with the classification society's rules or manufacturer's recommendations

1.4. Course Outline

	The piping systems on board ships, the system elements, the materials and the protection methods, the international regulations, namely propulsion systems (fuel oil, lubrication oil, compressed air (7.02:1.2.1.8.), cooling water (7.02:1.2.1.6., 1.2.2.11.-13.), steam and condensate, combustion air, exhaust gas system); general purpose and safety systems (ballast –7.02: 1.3.1.1., bilge – 7.02:1.3.1.2., firefighting –7.02:1.3.1.3., ventilation, drinking and sanitary water, sewage systems, operation and automation air (7.02:1.2.3.5.), air conditioning (7.02:1.1.3.2.) and ventilation, automation, hydraulics, sounding pipes, draining and overflow systems, filling systems, vent systems, exploitation). Marine refrigerating systems: design and optimization, application on board ships, system elements, automated operation and protection, exploitation, safety operation with refrigerants, maintenance. The systems related to liquid cargoes (inert gas, gas sampling systems, cargo loading/unloading systems, washing and crude oil washing systems, stripping and draining systems, heating and cooling of cargo). The exploitation of systems, local and remote operation and surveillance, the sea environment protection (7.02: 1.3.1.4.-5).

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☒ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	Upon completion of laboratory exercises students need to create final laboratory reports consisting of tables with measured values, heat diagrams and explanations.	

1.7. Student Obligations

Beside lectures and exercises students have to deliver four home works and a set of laboratory exercise reports.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	0,5
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% during classes (learning outcomes 1 – 8) and 30% on final exam (learning outcomes 1 – 8) in accordance with the University's and Faculty's normative acts.

Continuous assessment:

- Student are prompted to solve four numerical home works
- One practical exam on the engine room simulator – fresh water generator
- Final report on practical refrigerating simulator exercises
- Two theoretical partial exams – first on marine piping and second on refrigerating systems (60%) – outcomes 1 – 8. Second partial exam has two preconditions: theoretical and practical part
- 4 % students gain for correct solving of four numerical home works (outcomes 3, 4, 6) and another one (1 %) for practical work on fresh water generator simulator (outcomes 5, 6), while another 5% students gain for correct performance on laboratory exercises (outcomes 1 – 7).
- On written final exam complete field of marine auxiliary systems is assessed.

Examples of assessment for outcome:

1. On the marine auxiliary system's schematic representation recognize its function and the function of each element (outcomes 1, 2, 3, 5, 7)
2. Read out measured values and diagnose the fault in the system, make basic calculation of the element to be replaced, plan and execute replacement (outcomes 2, 4, 5, 6,7)
3. Evaluate local and remote indication of measured parameters, dependence between manometric and absolute pressure, analog and digital indication (outcomes 1, 2, 7, 8)

- Student with exceptional results during the semester (i. e. at least 63 point out of possible 70, are freed of final exam and final mark is calculated proportionally [Example for 65 out of 70 – FP=65/70*100=92,86% - excellent (5), A]
- Students have possibility to write scientific paper with the teacher. The paper may or may not be a part of undergraduate thesis. In accordance with the paper and the publication accepting the paper classification, the student could be awarded with the final mark. The paper should be accepted for publication until the end of semester.

1.10. Main Reading

1. Kralj Predrag, Šegulja Ivica, Brodski cjevovodi, Pomorski fakultet, Rijeka, 2018.
2. Martinović Dragan, Brodski rashladni uređaji, Školska knjiga, Zagreb, 1994.
3. Learning materials published on the lecturer's web page and on the e-learning system Merlin

1.11. Recommended Reading

1. Martinović Dragan*, Brodski strojni sustavi, Pomorski fakultet, 2005.*
2. Matković Milan, *Protupožarna zaštita na brodovima*, Pomorski fakultet, Rijeka, 1995.
3. Martinović Dragan, Stanković Predrag, Sustav inertnog plina, Pomorski fakultet, Rijeka, 1995.
4. Martinović Dragan, Stanković Predrag, Sigurnost na tankerima, Pomorski fakultet, Rijeka, 1995.
5. Martinović Dragan, Stanković Predrag, Pranje tankova sirovom naftom, Pomorski fakultet, Rijeka, 1992.
6. Ozretić Velimir, Brodski pomoćni strojevi i uređaji, Ship management, Split, 1996.
7. Marsh, R. W., Olivo, C. T., Refrigeration, Delmar Publishers, Inc., Bombay, 1966.
8. Golber, P. F., Refrigeration Servicing, Delmar Publishers, Inc., Bombay, 1971.
9. Knak Christen, Diesel Motor Ships – Engines and Machinery, G-E-C GAD Publishers, Copenhagen, 1979.
10. Kralj, P. – Martinović, D. – Tudor, M.: *Analysis of thermodynamic and technological basics of the marine fresh water generator model*, Desalination and water Treatment, (2017) 1-6, doi:10.5004/dwt.2017.21552
11. Pavić, D. – Kralj, P. – Lenac, D.: *Legionella pneumophilia on board ship's freshwater systems and technological and organizational measures of prevention and suppression*, Scientific journal of maritime research – Pomorstvo, Rijeka, God. 31 (2017), Vol. 1, pp.81-83
12. Vorkapić, A. – Martinović, D. – Kralj, P.: *The analysis of the maintenance systems of a LPG carrier's liquefaction system main components*, Scientific journal of maritime research – Pomorstvo, Rijeka, God. 31 (2017), Vol. 1, pp.3-9
13. Glujić, D., Kralj, P., Dujmović, J., *Considerations on the Effect of Slow-Steaming to Reduce Carbon Dioxide Emissions from Ships*, , Journal of Marine Science and Engineering (MDPI) – 10, doi.org/10.3390/jmse10091277
14. Kralj, P., Martinović, D., Tudor, M., Lenac, D., *Optimized Marine Fresh Water Generator Control System. // Naše more : znanstveni časopis za more i pomorstvo, 68 (2021), 1; 28-34* doi:10.17818/NM/2021/1.3
15*. Glujić, D., Kralj, P., Martinović, D., A Simple Mathematical Model for Refrigerating Compressor Optimization. // Pomorstvo : scientific journal of maritime research, 32 (2018), 1; 146-151*

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Kralj Predrag, Šegulja Ivica, *Brodski cjevovodi, Pomorski fakultet, 2018.*	Bibliothek 7 Faculty Book Store 150	80
Brodski strojni sustavi	Bibliothek 7 Faculty Book Store 0	
Matković Milan, *Protupožarna zaštita na brodovima*, Pomorski fakultet, Rijeka, 1995.	Biblioteka 14 Skriptarnica 500	25
Martinović Dragan*, Brodski rashladni uređaji, Školska knjiga, Zagreb, 1994.*	Biblioteka 5	25

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

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3.2. Course description

Generic information			
Head of Course	**Radoslav Radonja, Ph. D., associate professor**		
Course	**Technical supervision and ship classification**		
Study Programme	**Marine Engineering**		
Level	**Undergraduate**		
Type of Course	**STCW - obligatory**		
Year of Study	**3**		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		**4**
	Number of Hours (L+E+S)		**30 + 15 + 0**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The course aims to enable students to become proficient in Rules for the Technical Supervision of sea-going ships as well as ship classification.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

After passing the exam, students will be able to:

1. Explain and correctly interpret the Registry Rules
2. Define machinery ship class inspections
3. Explain performed inspection report or failure machine device report
4. Explain and identify regular and extraordinary examinations
5. Identify and explain Chief engineer survey procedure
6. Explain and recognize differences between classification and statutory certificates
7. Explain and recognize the importance of non-destructive material inspection
8. Explain and recognize the importance of classification review, certification, authorization of the Registry for the issuance of statutory certificates.

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1.4. Course Outline

Rules prescribing internationally (IACS) accepted technical standards for carrying out technical controls for the seagoing ships. Introduction to the Registry Rules, Ship Class, Classification Documents, Loss of Class, Types of Inspections, Construction Supervision, Type Approval, Sea trial, Chief Engineer survey, Inspections of steam turbine, Gas turbine inspection, Auxiliary machinery, steering gear, pressure vessels, ship screws and shafts, safety systems, special ships, metal materials and inspection in accordance with statutory certificates.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Active class attendance, 1st colloquium, 2nd colloquium and final oral exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,0	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes takes place in accordance with University's and Faculty's normative acts as follows:

- through continuous testing of knowledge during classes, 70% of the acquired learning outcomes are evaluated through the 1st colloquium - learning outcomes 1 – 4 (35%), 2nd colloquium - learning outcomes 5 – 8 (35%), while the student must realize a minimum of each colloquium 50% points
- at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-8), and the student must realize a minimum of 50% of points in order to pass the final exam.

Examples of evaluating learning outcomes in relation to set learning outcomes are:

1. Explain visual inspection for class assignment?
2. Critically evaluate the measured parameters during the chief engineer survey?
3. Recognize the validity of classification and statutory certificates?
4. Explain inspection of steam generators, propulsion and auxiliary machinery?
5. Explain the ship's device type approval?
6. Explain and identify the classification ship machinery automation features?

1.10. Main Reading

1. Rules for technical supervision and ship classification - Croatian Register of Shipping (CRS), Split
2. Lecturer presentations

1.11. Recommended Reading

3. Web pages – IACS

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Rules for technical supervision and ship classification - Croatian Register of Shipping (CRS), Split	15	60

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

[1] **NOTE:** 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. Use empty fields for additional activities.

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3.2. Course description

Generic information			
Head of Course	Dr.sc. Dean Bernečić, full professor		
Course	Simulator Operation Training 1		
Study Programme	Marine engineering		
Level	Undergraduate		
Type of Course	Obligatory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		15+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to acquaint the students with the proper preparation of the propulsion plant and auxiliary plant on the existing simulator with logical reasoning and critical thinking.

1.2. Prerequisites for Course Registration

Marine Engineering Secondary Naval School or completed and passed an additional Course from the basics of ship systems and facilities for 1st year students who have not completed secondary naval school. It is advisable to pass the courses of the profession (Marine Engines, Marine Engine Systems, Marine Steam Generators, Marine Turbines, Refrigeration equipment and Systems, Auxiliary Machinery Systems).

1.3. Expected Learning Outcomes

After training and learning on the MAN B&W, MC 90 engine propulsion model, the student will be able to;

1. Prepare auxiliary engines for start and start them;
2. Connect and disconnect generators on main switch board and select and adjust load sharing modules in parallel operation of multiple generators,
3. Prepare and start an auxiliary steam generator and establish the heating of the main consumers, prepare the exhaust gas boiler (EGB),
4. Prepare and start fuel oil and lube oil separators, steering gear system and stern tube system,
5. Prepare and start the main engine and start the EGB,
6. Prepare and start the fresh water generator and oil-bilge water separator,
7. Prepare and start the turbo-generator and shaft generator,
8. Prepare, start and explain the function of all other auxiliary systems and devices of the ship's engine room and explain the interdependence of individual systems.

1.4. Course Outline

The Kongsberg KSIM V-5 simulator, on a VLCC ship (MAN B&W, MC 90 engine), simulates the actual propulsion of a crude oil tanker. The model includes most of the ship's systems and devices necessary for the functioning of the ship. Lectures and exercises prepare students for their future profession as an engineer officer. The course content includes the preparation and starting of auxiliary and main engines, the setting up of electrical power, the preparation and starting of auxiliary engines and devices, the reading and analysis of the most important parameters in the operation of individual systems and devices. The training covers the management of lube oil,

fuel oil, fresh water and seawater systems, steam, air, ventilation, heating and cooling systems. Management and operation of lube oil and fuel oil purifiers, fresh water generator, steering gear and stern tube system.		
1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☒ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Required lectures and exercises in min. range of 75% (90% for obtaining special certificates according to STCW 73/78).

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	1.5	Presentation		Practical work	
Portfolio		Final exam	1				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% in class and partial exams (colloquium), 30% in final exam; according to the University of Rijeka Study Regulations and the Study Regulations at the Faculty of Maritime Studies in Rijeka (Outcomes 1 - 9).
Colloquium 1 (I1, I2)
Colloquium 2 (I1, I2, I3, I4)
Colloquium 3 (I4, I5, I6, I7, I8)
Examples of simulator checks: Properly prepare and start diesel generators, connect them to the MSB, know to read parameters (I1, I2, I8).
Exams Questions Example:
Explain the main engine LT and HT cooling water circuits (I1, I5, I6, I8),
Explain the ME lube oil temperature regulation (I5, I8),
Valuation: Percentages according to the checklist with respect to proper and incorrect procedures during operation. The final exam involves checking the understanding of overall work on simulator.

1.10. Main Reading

D. Bernečić, R. Radonja; Praktikumi za vježbe te upute za rad na simulatoru; LITERATURA ZA RS 1 – e.učenje MERLIN (https://www.pfri.uniri.hr/web/hr/zavod_BS.php?pregled&id_username=10)

1.11. Recommended Reading

Instrukcione knjige s brodova,
Koljatić, V., Priručnik za strojarski simulator,
Rumac, Filip ; Glujić, Darko ; Bernečić, Dean: „The influence of SCR on main engine parameters“, Pomorstvo, 2022.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
		70

[1] NOTE: 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. Use empty fields for additional activities.

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1.13. Quality Assurance
The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information			
Head of Course	Fran Torbarina, Ph.D.		
Course	Maintenance management		
Study Programme	Marine Engineering		
Level	Undergraduate degree programme		
Type of Course	Mandatory		
Year of Study	III		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Introducing students to the basic laws of failures distribution, and transfer this knowledge to ship systems and the ship as a whole.

1.2. Prerequisites for Course Registration

Brodski motori, Brodski pomoćni uređaji i strojevi, Konstrukcija broda, Brodski strojni sustavi .

1.3. Expected Learning Outcomes

After attending and passing the course, students will be able to:

1. *Explain the main causes and occurrence of failures in technical systems*
2. Specify and describe types of failures which may occur during the exploitation of technical systems
3. Calculate the reliability of various technical systems
4. Explain the significances of the organization and maintenance strategy and their influence on maintenance costs
5. Specify and explain various strategies for technical system maintenance
6. Specify types of spare parts and select the appropriate type for various parts of technical systems.

1.4. Course Outline

Maintenance costs. Damage and failures. Reliability of technical systems. Maintenance technology and organization. Maintenance strategies: preventative maintenance, corrective maintenance, overhaul maintenance, condition maintenance. Maintenance of the underwater part of the hull and the propeller. The impact of automation on maintenance. Spare parts.

1.5. Modes of Instruction	☒ Lectures ☒ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Compulsory attendance (at least 70%).

1.8. Assessment[1] of Learning Outcomes

Course attendance	1	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure of evaluating the accomplished learning outcomes is carried out according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- 70% of the accomplished learning outcomes is evaluated through continuous testing of knowledge during classes
- 30% of the accomplished learning outcomes is evaluated at the final exam. To pass the final exam, a student must realize a minimum of 50% of the final exam points

1.10. Main Reading

Šegulja, Bukša, Tomas: Održavanje brodskih sustava, Pomorski fakultet u Rijeci, 2007;
Lovrić: Osnove brodske terotehmologije, Pomorski fakultet, Dubrovnik, 1989;
Rejec: Terotehnologija, Informator, Zagreb, 1974;
Bonefačić: O preventivno-planskom održavanju brodova u kontekstu terotehnologije, Zbornik radova Fakulteta za pomorstvo i saobraćaj u Rijeci, 1984;

1.11. Recommended Reading

1. I.Berezovski: Reliability Theory and Practise
2. A.Kelly: Maintenance Planning nad Control
3. B.Vučinić: Maintenance Concept Adjustement of Design.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Šegulja, Bukša, Tomas: Održavanje brodskih sustava, Pomorski fakultet u Rijeci, 2007.	20	20

1.13. Quality Assurance

The quality of studying is continuously monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An annual analysis of exam pass rates is conducted, and a student survey is carried out once per semester (attached with the faculty description). All data, including exams, written work, and grading, are at all times publicly available to all students enrolled in the course.

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Course description

Generic information			
Head of Course	Mirjana Borucinsky, PhD		
Course	English Language V		
Study Programme	Marine Engineering		
Type of Course	Elective		
Year of Study	3	Semester	5
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		15+0+30

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to develop the students' speaking and presentation skills in English for Specific Purposes.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

The students are expected to be able to:

1. Using specialized terminology provide a critical overview of the advantages and disadvantages of various types of propulsion and machinery.
2. Using specialized terminology provide a critical overview of marine auxiliary machinery.
3. Make and hold a presentation independently.

1.4. Course Outline

Writing letters, e-mail. Memorandums, circular letters and engine manufacturer notes. Examples of correspondence from ship engineering practice. Notes in the engine room log. Notes about the condition of the rings, pistons and grooves. Notes about the condition of the liner. Notes about measuring clearance and the condition of bearings. Notes about bearing and bolts inspection. Dry docking specifications.
Grammar: Language structures in orders, advice and recommendations, instructions, work specifications

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☐ Field work	☐ Other _____

1.6. Comments

1.7. Student Obligations

Class attendance, activities, continuous assessment and final exam (written and oral)

1.8. Assessment[1] of Learning Outcomes

Course	1,5	Class participation		Seminar paper	1	Experiment	

[1] **NOTE:** 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. Use empty fields for additional activities.

attendance							
Written exam		Oral exam	0,5	Essay		Research	
Project		Continuous Assessment		Presentation		Practical work	
Portfolio		Final exam					

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

60 % in class, 40 % at the final exam (outcomes 1-3).
Independent work (presentation) (50 %)
Activity in class (doing exercises in the learning platform Merlin) (10 %)
Final oral exam (40 %) (outcomes 1-3)

Example of assessing the independent work (presentation)
Draw conclusions about the researched topic and present results.

Examples of assessment for each outcome in the final exam:

1. Provide a critical overview of advantages and disadvantages of different types of propulsion, describe the process of reversing in a slow-speed two-stroke diesel engine in English.
2. Describe the auxiliary machinery in English.

1.1. Main Reading

Spinčić, A.-Pritchard, B.: An English Textbook for Marine Engineers II, Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.

1.2. Recommended Reading

Lamb: Questions and Answers in Marine Engineering (CD)
moodle.srce.hr

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Spinčić, A.-Pritchard, B.: *An English Textbook for Marine Engineers* II, Pomorski fakultet IV izmijenjeno i dopunjeno izdanje, Rijeka 2002.	15	30

1.4. Quality Assurance

The quality of the course is monitored in accordance with the ISO 9001 system and the European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the course are analyzed and appropriate measures implemented accordingly.

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Generic information			
Head of Course	Ivan Panić, PhD		
Course	Marine Electric Power Systems		
Study Programme	Marine Engineering		
Type of Course	Elective		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of this course is to provide students with appropriate knowledge of marine electrical power systems, focusing on high-voltage technologies and electrical propulsion systems as prescribed by STCW and IMO Model Course for the Engine Officer service

1.2. Prerequisites for Course Registration

Completed courses: Marine Electrical Engineering, Marine electrical machines and drives

1.3. Expected Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Describe, analyse, and evaluate configurations of ship electrical power systems and demonstrate knowledge of the related technical regulations.
2. Explain the technical and economic aspects of high-voltage applications and apply safety measures when working on high-voltage systems.
3. Define and explain switchboards and switching technology.
4. Describe and explain measuring and protective instrumentation, automatic control systems, and electrical protection.
5. Understand the operating principles and basic components of ship electric propulsion systems and, evaluate power quality parameters on ships with electric propulsion.
6. Apply condition diagnostics and handling techniques for devices and systems.

1.4. Course Outline

Technical and economic aspects of high voltage systems on board. Voltage and frequency systems. Technical rules and regulations. Switchboards and switchgear. System configurations. Measurement and protection instrumentation. Supervision and control systems. Propulsion electric motors. Propulsion frequency drives. Power quality. Electric protective systems. HV electrical safety procedures. System diagnostics. Device and system handling.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Regular class attendance, continuous assessment, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka as follows:

1. Through continuous assessment during the course, where the student can earn up to 70% of the total grade points:
   - 1st midterm exam – 35% of grade points
   - 2nd midterm exam – 35% of grade points

The midterm exams in given in written format. For each midterm exam, student must achieve at least 50% of the points. As the passing threshold for continuous assessment of learning outcomes is determined to be 50%, student is allowed one retake of each midterm exam.

2. Through the final exam, which the student may attend upon earning a sufficient number of grade points during the course:
   - Final exam – 30% of grade points

The final exam is oral. The student must achieve at least 50% of the points available on the final exam.

Examples of evaluating learning outcomes in relation to the set learning outcomes are:

1. Sketch and explain the parts of the principal single-line diagram of a radial marine electrical power network.
2. List and explain personal protective equipment (PPE) and isolation procedures used during maintenance of high-voltage shipboard systems.
3. Identify key components of a high-voltage switchboard and explain the operating principles of circuit breakers and contactors used within.
4. Explain the working principle of a differential protection relay and its application in a HV generator circuit.
5. Describe the operating principle of cycloconverter
6. Interpret insulation resistance test results for a high-voltage motor and determine whether corrective maintenance is needed.

1.10. Main Reading

Teaching materials on the Merlin e-learning system (https://moodle.srce.hr)

1.11. Recommended Reading

1. Skalicki B., Grilec J.; Električni strojevi i pogoni, Fakultet strojarstva i brodogradnje, Zagreb, 2005.
2. Rashid, M.H.; Power electronics handbook 5th ed., Butterworth-Heinemann, 2024.

[1] NOTE: 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. Use empty fields for additional activities.

3. Patel, M.R.; Shipboard electrical power systems. Crc Press, 2021.
4. Stefan Kopatsch S., Kopatsch G.; ABB switchgear manual 13th ed., Hitachi ABB Power Grids, 2020.
5. Hall D.T.; Practical marine electrical knowledge, Witherby Seamanship International, 2014.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials on the Merlin e-learning system	Available on Web	50

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analysed and appropriate measures are adopted.

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3.2. Course description

Generic information			
Head of Course	**Robert Baždarić, Ph.D.**		
Course	Marine automatic control		
Study Programme	Marine engineering		
Type of Course	Elective		
Year of Study	3rd		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are to acquire knowledge of the functioning of process computers in the control systems used on board.

1.2. Prerequisites for Course Registration

There are no prerequisites.

1.3. Expected Learning Outcomes

After passing the exam, students will be able to do the following:

1. explain the procedures for setting up ship control systems (SCS)
2. explain the technical and economic aspects of ship automation
3. discuss the characteristics of multi-hierarchical control systems on board
4. explain the methods on which the SCS assessment is based
5. describe and illustrate the circuit and software structure of the SCS
6. demonstrate different implementations of the algorithm for controlling the technological processes of ship systems
7. explain the structure and method of programming a programmable logic controller (PLC)
8. demonstrate the functional principles of automation of individual ship systems.

1.4. Course Outline

Development directions of computer control systems on board. Hierarchical control systems. Definition of the requirements for the circuits and software support with regard to the characteristics of the control system. Synchronization of the algorithm with the process. The effect of constraints on the control system. Programmable controllers and programmable logic controllers PLC. Examples of monitoring, control and data acquisition systems. Factors influencing the further improvement of computerized control systems on board ships.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

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1.7. Student Obligations

Regular participation in class, 1st colloquium, 2nd colloquium, tests from laboratory exercises and final examination

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	0,75	Oral exam		Essay		Research	
Project		Continuous Assessment	1,25	Presentation		Practical work	0,5
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for the assessment of acquired learning outcomes is carried out in accordance with the Study Regulations of the University of Rijeka and the Study Regulations of the Faculty of Maritime Studies in Rijeka as follows:

- 70% of the acquired learning outcomes are assessed by continuous knowledge tests during class through the 1st colloquium, learning outcomes 1-4 (25%), 2nd colloquium, learning outcomes 5-8 (25%), submission or tests in laboratory exercises, learning outcomes 1-8 (20%)
- Depending on the student's success in the continuous assessment, the student may be granted the right to be exempted from the assessment of the examination.
- In the final part of the exam, 30% of the acquired learning outcomes (1-8) are assessed and the student must achieve at least 50% of the points to pass the final exam.

Examples of the assessment of learning outcomes in relation to the defined learning outcomes are:

1. Which devices are used for control and which for regulation in the individual development phases of ship automation and what are the characteristics of these phases?
2. How do economic aspects affect the autonomy of certain control systems?
3. Draw a block diagram of the multi-hierarchical control system on board.
4. List the concepts that describe the actions, relationships and logic of the control system.
5. Explain the development cycles and specific difficulties in developing a new control system.
6. Explain the specific tasks, control levels and input/output circuits in SCS.
7. What is a PLC, its structure, what is a "scan" cycle and a "ladder" diagram?
8. How can you recognize control algorithms?
9. Using the example of an integrated ship control system (e.g. K-CHIEF), name the features, configurations and types of connected process devices.
10. Using the example of a system for measuring the filling level of cargo or cargo handling, name the operating principles, features and configurations.

1.10. Main Reading

V. Tomas, Brodsko automatsko upravljanje, autorizirana predavanja**,** Pomorski fakultet, Sveučilište u Rijeci, 2019. Teaching material on the Merlin e-learning system (https://moodle.srce.hr).

1.11. Recommended Reading

1. Radovan Antonić: Automatizacija broda II, Pomorski fakultet u Splitu, 2003
2. George M. Siouris: Missile Guidance and Control Systems, Springer New York, 2013
3. Konsberg manual-"Integrated ship control-Functional specification-Power menagment system, process control unit, signal acquisation unit".

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
V. Tomas, Brodsko automatsko upravljanje, autorizirana predavanja**,** Pomorski fakultet, Sveučilište u Rijeci, 2019. Teaching material on the Merlin e-learning system (https://moodle.srce.hr):	NA	30

1.13. Quality Assurance

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The quality of the study programme is constantly monitored in accordance with the ISO 9001 system introduced at the Faculty of Maritime Studies in Rijeka. Examinations are analyzed annually and a student survey is conducted once a semester.

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3.2. Course description

Generic information			
Head of Course	Fran Torbarina, Ph.D.		
Course	Economics of ship running		
Study Programme	Marine Engineering		
Level	Undergraduate degree programme		
Type of Course	Elective		
Year of Study	III		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objective of the course is to acquaint students with the field covered by the economics of ship exploitation, and through exercises to apply this knowledge to specific cases in practice.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

After attending and passing the course, students will be able to:

1. Explain fundamental costs of ship exploitation
2. Specify the main features which impact the ship economics
3. Specify and explain the types of charters and their impact on costs
4. Specify and describe the impact of various factors on the size and speed of the ship
5. Apply various cost models on different shipping cases.

1.4. Course Outline

ECONOMICS OF SHIP EXPLOITATION. Definition, subject of research, application of scientific and theoretical knowledge in practice.
THE BASICS OF ECONOMICS. Cost theory: the concept of costs, types, locations and cost carriers, fixed and variable costs.
CALCULATIONS. Measuring business results. Business success and benchmarks, productivity, economy, profitability.
BOAT EXPLOITATION TECHNIQUE. Economic and technological criteria defining different types of shipping. Passenger shipping, freelance, liner, tanker shipping.
FORMATION OF VEHICLES IN MARINE SHIPPING. The concept and types of fares. Characteristics and formation of freight rates in certain types of shipping industry.
MARITIME TRANSPORT COSTS. Definition of cost and cost. Types of costs in marine shipping. Fixed and variable costs. Marginal cost. A model of the total cost of a ship's voyage.
OPTIMIZATION OF SHIPPING COSTS.
PERFORMANCE INDICATORS IN MARITIME SHIPPING. Productivity. efficiency. profitability. Optimal size and speed of the ship in terms of economy and cost-effectiveness.

1.5. Modes of Instruction	☒ Lectures ☒ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Compulsory attendance (at least 70%).

1.8. Assessment[1] of Learning Outcomes

Course attendance	1	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure of evaluating the accomplished learning outcomes is carried out according to the Ordinance on Studies of the University of Rijeka and the Ordinance on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- *70% of the accomplished learning outcomes is evaluated through continuous testing of knowledge during classes*
- *30% of the accomplished learning outcomes is evaluated at the final exam. To pass the final exam, a student must realize a minimum of 50% of the final exam points*

1.10. Main Reading

1. B.Bonefačić : Osnovi organizacije I ekonomike za brodske pogonske inžinjere
2. Rubinić, I.: Ekonomika brodarstva, Ekonomski fakultet, Rijeka, 1976.
3. Glavan, B.: Ekonomika morskog brodarstva, Školska knjiga, Zagreb, 1992.
4. Kesić, B., Počuča, M.: Ekonomika Brodarstva, Vježbe, Pomorski fakultet u Rijeci, Rijeka, 2001.

1.11. Recommended Reading

Stopford, M.: Maritime Economics, Routledge, London & New York, 2000.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Parat: Brodski motori s unutarnjim izgaranjem, Sveučilište u Zagrebu, 1990..	5	20

1.13. Quality Assurance

The quality of studying is continuously monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An annual analysis of exam pass rates is conducted, and a student survey is carried out once per semester (attached with the faculty description). All data, including exams, written work, and grading, are at all times publicly available to all students enrolled in the course.

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3.2. Course description

Generic information			
Head of Course	Prof. Goran Vukelić, PhD.		
Course	Vibrations and Noise		
Study Programme	Marine Engineering, BSc.		
Type of Course	Elective		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4	
	Number of Hours (L+E+S)	30+15+0	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquiring theoretical and practical knowledge of vibration and noise analysis. Understanding the effect of vibrations and noise on constructions, engines, and people.

1.2. Prerequisites for Course Registration

Completed “Engineering Mechanics 1&2”.

1.3. Expected Learning Outcomes

After passing the exam, the student will be able to:
1. Apply the laws of mechanics to solve the problems of vibrations and noise.
2. Describe the effect of vibrations and noise on constructions, engines, and people.
3. Apply the methods of vibrations and noise measurement.
4. Analyze the results of calculations and measurements.

1.4. Course Outline

Introduction to vibration and noise. Basics of one-degree and two-degree freedom systems vibrations. Free and forced vibrations, damped and undamped vibrations. Source, transmission, and isolation of vibrations. Pendulum. Axial, flexural, and torsional vibrations. Source and spreading of sound. Noise and noise protection. Legislation and standards concerned with noise and vibration. Measurement of vibration and noise. Vibration and noise on ships. Vibration and noise modelling.

1.5. Modes of Instruction	☒ Lectures ☒ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

1.7. Student Obligations

Attending the lectures and exercises (min. 70%), attending the assessment and exams, and submitting the results of assignments.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation	0.5	Seminar paper		Experiment	0.5
Written exam	1	Oral exam		Essay		Research	
Project		Continuous Assessment	0.5	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

According to the study rulebooks of the University of Rijeka and the Faculty of Maritime Studies, 70% of learning outcomes will be assessed through continuous assessment during the semester (colloquium, seminars, laboratory exercises), 30% of learning outcomes through a final exam with a passing rate set at a minimum 50% of final exam points.

Examples of evaluation in correlation to learning outcomes:

1. Determine the dynamic equilibrium of oscillating bodies and systems.
2. Positive and negative effects of vibrations and noise.
3. Measure displacement, speed, and acceleration of the oscillating body.
4. Compare experimental and calculated results.

1.10. Main Reading

D. Pustaić, H. Wolf, Z. Tonković: Mehanika III, Tehnička knjiga, 2005.
Senjanović, I.: Vibracija broda I, Sveučilište u Zagrebu, Zagreb, 1974.

1.11. Recommended Reading

Video lectures on Merlin.
F. Fahy, D. Thompson: Fundamentals of sound and vibration, CRC Press, 2015.
G. Vizentin, G. Vukelić, L. Murawski, N. Recho, J. Orović: Marine propulsion system failures - A review, Journal of marine science and engineering, 2020.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
D. Pustaić, H. Wolf, Z. Tonković: Mehanika III	1	20
I. Senjanović: Vibracija broda I	1	20

1.13. Quality Assurance

According to the ISO 9001 system set at the Faculty of Maritime Studies, Rijeka. Once a year, an analysis of the passing exam rate is conducted. Once a semester, an anonymous online survey of students is conducted.

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3.2. Course description

Generic information		
Head of Course	Rikard Miculinić, M.Sc.	
Course	Engineering Drawing	
Study Programme	Marine engineering	
Type of Course	Electoral	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS student workload coefficient	4
	Number of hours (M+V+S)	15+30+0

1. 1. GENERAL COURSE DESCRIPTION

1.1. Course objectives

The aim of the course is to master the basic knowledge of technical sketching and drawing in CAD. The knowledge acquired in this course enables the participant in the ship's operation to read finished and create new technical drawings of machine elements with all the necessary data for production.

1.2. Prerequisites for Course Registration

Marine Engineering elements

1.3. Expected learning Outcomes

After passing the exam, students will be able to:

1. Differentiate between the ISO norms of engineering graphics and the rules for making technical drawings.
2. Sketch the object in orthogonal projection, apply sections and dimensions.
3. Sketch the object in spatial projection
4. Explain and apply basic drawing commands in CAD.
5. Create new and read finished technical drawings freehand and using a computer in CAD.

1.4. Course Outline

The course contains rules and recommendations of ISO and DIN standards for designing technical drawings. Sketching - drawing straight lines, drawing circles. Sketching objects in orthogonal projection. Sketching objects in axonometric projection. Drawing sections and dimensioning.
CAD - parameter settings, coordinate system, handling drawings, basic drawing commands, basic commands for changing drawings, writing text, blocks, dimensioning, hatching and the basics of drawing in three dimensions.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☒ E-learning ☐ Fieldwork	☒ Practical work ☐ Multimedia and network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student obligations

In addition to mandatory lectures and exercises, the student is required to create a complex graphics program. Final exam.

1.8. Assessment1 of Learning Outcomes

Course attendance		Class participation	1	Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project	1	Continuous Assessment	1	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The evaluation process of acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka in the following way: 70% in class, 30% in the final exam (outcomes 1 - 6). Of the possible 70% during the semester, 50% is for the created graphics programs and 20% for the created exercises.

The requirement for taking the final exam, according to the regulations, is 35%.
Examples of evaluation by individual outcome in the preliminary and final exams:

1. 20% is for correctly completed exercises. (learning outcomes 1,2,3,4,5)
2. 50% goes to the programming task (learning outcomes 1,2,3,4) with the obligatory creation of the program in CAD.
3. The final exam includes a written test of outcomes 1,2,3,4,5.

Examples of evaluation by individual outcome in exercises and the final exam:
1. Sketch the given object by hand, and create a workshop drawing in CAD
2. Program: Create a complex assembly drawing of a functional ship element. (base bearing, pneumatic starting valve, sprinkler ...)
3. Final exam: the elements used in the development of the program are matched (learning outcomes 1,2,3,4,5)

1.10. Main Reading

Bukša, A., Grafičke komunikacije – Zbirka zadataka, Pomorski fakultet Rijeka, 2001.

1.11. Recommended Reading

1. Marunić, Gordana, Elementi inženjerske grafike, Rijeka,Tehnički fakultet, 1998.
2. Opalić M., Kljajin M., Sabastijanović S., Tehničko Crtanje, Sveučilište u Zagrebu, Fakultet strojarstva i brodogradnje, 2003.
3. Bogolyubov, S., Exercises in machine drawing, Moscow, Mir Publishers, 1989.
4. Duff J. - Ross W., Freehand Sketching: For Engineering Desing, London, An International Thomson Publishing, 1995.
5. Lamit, L. – Kitto, K., Principles of Engineering Drawing, St. Paul, West Publishing Company, 1994.
6. Prebil, Ivan, Tehnična dokumentacija, Ljubljana, Tehniška založba Slovenije, 1995.
7. Parker M.- Dennis L., Engineering drawing fundamentals, Cheltenhan, Stanley Thornes, 1990.
8. Parker M.- Pickup F., Engineering drawing with worked examples 1, Cheltenhan, Stanley Thornes, 1990.
11. Parker M.- Dennis L., Engineering drawing fundamentals, Cheltenhan, Stanley Thornes, 1990.
12. Parker M.- Pickup F., Engineering drawing with worked examples 1, Cheltenhan, Stanley Thornes, 1990.
13. Hercigonja, Eduard, Tehnička grafika, Zagreb, Školska knjiga, 1996.
14. Kovač, Branko, Tehničko crtanje, Zagreb, Školska knjiga, 1975.

1.12. Number of Main Reading Examples

Title	*Number of copies*	*Number of students*
Bukša, A., Grafičke komunikacije – Zbirka zadataka, Pomorski fakultet Rijeka, 2001.	12	50

The course material is available on the e-learning system – Merlin in electronic form.	-	50

1.13. Quality Assurance

The quality of studies is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exam taking is prepared annually, and a survey among students is conducted once a semester.

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3.2. Course description

Generic information		
Head of Course	Vladimir Pelić, PhD	
Course	FAILURE DIAGNOSIS	
Study Programme	Marine Engineering	
Type of Course	Obligatory	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	15 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquiring knowledge about failures of ship's mechanical systems and devices, methods of diagnosing failures, proper monitoring of influential parameters in operation and maintenance of shipboard facilities. By simulating individual failures and errors on ship's engine room simulators, and their consequences, students should be able to explain and analyze individual failures and learn the correct procedures during troubleshooting.

1.2. Prerequisites for Course Registration

Attended course: Work on the simulator 1

1.3. Expected Learning Outcomes

After completing and passing the course, students will be able to:

1. Describe and explain basic concepts and methods of diagnosing faults.
2. Explain the occurrence of faults caused by errors in design, production, assembly, transport, test run, operation, maintenance and inspection
3. Analyze faults in auxiliary machines and devices.
4. Analyze faults in steam generators.
5. Analyze faults in steam turbine plants.
6. Analyze faults in diesel engines.

1.4. Course Outline

Fundamentals and methods of fault diagnosis. Identification, causes and elimination of malfunctions in ship's steam generators, steam turbines, diesel engines, separators, pumps, fans, compressors, electrical machines and devices and various ship systems.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

At least 70% attendance at lessons and exercises.

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1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation	0,5	Seminar paper		Experiment	
Written exam		Oral exam	0,5	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka in the following way:

- through continuous knowledge assessment during classes, 70% of the acquired learning outcomes are evaluated through the partial exam 1 (theory / exercises) - learning outcomes 1-2 (35% / 35%), partial exam 2 (theory / exercises) - learning outcomes 3-6 (35% / 35%), with the student achieving a minimum of 50% of points in each partial exam;
- at the final part of the exam, learning outcomes 1-6 (30%) are evaluated, whereby the student must achieve a minimum of 50% points to pass the final exam.

Examples of evaluating learning outcomes in relation to the set learning outcomes are:

1. Explain the term malfunction and malfunction diagnostics. List and explain the characteristic phases of work in the malfunction diagnostics process.
2. List and explain the types of failures that can be classified as running-in failures / random failures / time failures. What are the so-called "built-in influences" on the occurrence of a failure and what is their cause? List and explain the methods of technical diagnostics. Which methods can be counted as the so-called "objective methods"?
3. List and explain the causes of reduced supply in centrifugal pumps. List and explain possible causes of increased salinity in fresh water at the outlet of the fresh water generator, and the procedure and method for eliminating the failure. What are the possible causes of 'jerking motion' in the steering gear? What are the possible causes of loss of water seal in a centrifugal oil/fuel separator? ... EXERCISES: simulation of various failures on an engine room simulator.
4. List and explain the protections of a steam generator. List and explain the causes of the occurrence of a high water level in a steam boiler, and how such a failure can be eliminated. EXERCISES: simulation of various failures on the engine room simulator.
5. List and explain the protections of a steam turbine. List and explain possible causes of vibrations in a steam turbine and possible solutions. List and explain methods for checking the quality of lubricating oil in a turbine drive. EXERCISES: simulation of various failures on an engine room simulator.
6. List and explain the engine protections that stop / slow down the operation of a two-stroke diesel engine. List and explain the causes of the appearance of black smoke on the engine exhaust. List and explain on the indicator diagram the causes of the reduction in compression in a diesel engine. EXERCISES: simulation of various failures on the engine room simulator.

1.10. Main Reading

1. Teaching material – lecture presentations – available on the e-learning system - Merlin
2. Teaching material – exercise presentations – available on the e-learning system - Merlin

1.11. Recommended Reading

1. Cowley, J., The Running and Maintenance of Marine Machinery, The Institute of Marine Engineers, London, UK, 1994.
2. Kuiken, K., Diesel engines parts I and II, Target Global Energy Training, Onnen, NL, 2008.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
References (1.10.) available in electronic form.	-	50

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

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3.2. Course description

Generic information		
Head of Course	Predrag Kralj, PhD - Rikard Miculinić, M.Sc.	
Course	Marine hydraulics and pneumatics	
Study Programme	Marine engineering	
Type of Course	obligatory	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS student workload coefficient	4
	Number of hours (M+V+S)	30+15+0

1. 1. GENERAL COURSE DESCRIPTION

1.1. Course objectives

To introduce students to the types, functions and basic characteristics of hydraulic machines, as well as hydraulic and pneumatic valves and systems.

1.2. Prerequisites for Course Registration

Technical Mechanics II

1.3. Expected learning Outcomes

After passing the exam, students will be able to:
1. Apply the basics of fluid hydrodynamics and hydrostatics.
2. Identify the requirements that must be met by hydraulic drive media.
3. Differentiate between the types, construction and symbol of a hydraulic or pneumatic element.
4. Differentiate between the types, construction and symbols of hydraulic machines (pumps and hydraulic motors).
5. Demonstrate the functions of hydraulic or pneumatic systems.
6. Distinguish hydraulic or pneumatic equipment.

1.4. Course Outline

Physical foundations (hydrostatics, hydrodynamics). Fluid leakage through small openings. Requirements that hydraulic drive media must meet. Structure and overview of the hydraulic system. Basic performance and classification of pumps and rotary hydraulic motors. Low-speed motors. Pressure limiting valves. Hydraulic equipment. Classification of hydraulic systems. Pressure ranges, designs and overview of pneumatic plants. Basic control schemes of hydraulic and pneumatic systems.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Fieldwork	☐ Practical work ☒ Multimedia and network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	For students who meet all the requirements, fieldwork is provided as an additional option.	

1.7. Student obligations

1st midterm exam, 2nd midterm exam, completed exercises. Final exam.

1.8. Assessment1 of Learning Outcomes

Attending classes		Activity in class	1	Seminar paper		Experimental	

						work	
Written exam	1	Oral examination		Essay		Research	
Project		Continuous knowledge assessment	2	Report		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The evaluation process of acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka in the following way: 70% in class, 30% in the final exam (outcomes 1 – 6). Of the possible 70% during the semester, 60% is for two written tests, 10% for completed exercises

1. On the first preliminary exam, 30% is for learning outcomes 1,2,3
2. In the second preliminary exam, 30% is for learning outcomes 3,5,6
3. 10% is for correctly completed exercises. (learning outcomes 1,2,3,4,5,6)
4. The final exam includes an oral examination of all outcomes.

Examples of evaluation by individual outcome in the preliminary and final exams:
1. For the specified symbol, it is necessary to enter the name of the hydraulic element (outcome 1,2,3).
2. Sketch the symbol and write in capital letters the connection for the pump, tank and working connections.
   a) 4/3 hydraulically activated valve
   b) 3/3 distributor activated electromagnetically, output 1,2,3.
3. Sketch and explain a pressure regulator in a closed hydraulic system using the example of installing a pressure limiting valve on the pressure line of a pump supplying power to the motor (outcome 4).
4. Explain the operation of the system in the position of the distribution valve shown. (describe the role of the three pressure control valves, the sequence of actuation of the working cylinders, the outcome of step 5.

1.10. Main Reading

Šestan, A.: Oil Hydraulics and Pneumatics. Faculty of Maritime Studies, Rijeka, 2003.

1.11. Recommended Reading

Matković, M., Bukša, A. "Zbirka zadataka iz hidromehanike",
Pomorski fakultet, Rijeka, 1998.
Pečornik, M., "Tehnička mehanika fluida", Školska knjiga, Zagreb, 1985

1.12. Number of Main Reading Examples

Title	*Number of copies*	*Number of students*
Šestan, A.: Uljna hidraulika i pneumatika. Pomorski fakultet, Rijeka, 2003. (Šestan, A.: Oil Hydraulics and Pneumatics. Faculty of Maritime Studies, Rijeka, 2003.)	10	30
The course material is available on the e-learning system – Merlin in electronic form.	-	30

1.13. Quality Assurance

The quality of studies is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exam taking is prepared annually, and a survey among students is conducted once a semester.

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3.2. Course description

Generic information			
Head of Course	Dean Bernečić, PhD		
Course	Simulator operation training 2 (116523)		
Study Programme	Marine Engineering		
Type of Course	Compulsory		
Year of Study	III		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		15 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The course aims enable students to become familiar with the ship's steam propulsion turbine, turbine prime mover for auxiliary devices, various engine room systems. Simulating faults, students should be able to interpret and analyze errors.

1.2. Prerequisites for Course Registration

Ship ICE, Ship steam generators, Marine turbines, Marine auxiliaries

1.3. Expected Learning Outcomes

After passing the exam in this course students will be able to:
1. Explain and establish the ship's LNG power system
2. Explain how to prepare LNG ship engine room plant
3. Analyze and explain importance of a steam generator water quality
4. Explain and analyses operation of a steam generator working with liquid or gaseous fuel
5. Identify and explain fuel, sea, condensate, feed water, superheated steam systems
6. Analyze and explain main propulsion turbine regulation and protection systems
7. Explain and analyses the operation of turbogenerators and their preparations for parallel operation
8. Explain and analyses start of the main propulsion turbine
9. Analyze the parameters in the operation of the ship's LNG ship's machinery plant

1.4. Course Outline

Introduction to LNG simulator, familiarization with pipe diagrams and devices, preparation of diesel and emergency generators, sea system, condensate, power supply, superheated steam systems, preparation and start-up turbo feed pumps and turbogenerators, preparation others auxiliary machinery and equipment, main turbine oil system, preparation and start of fuel and oil separators, preparation of main propulsion steam turbine, monitoring parameters of main propulsion steam turbine and other devices.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

In addition to the obligatory lectures and exercises, the student is obliged to pass the examinations and pass the final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Procedure for evaluating acquired learning outcomes: - The final grade in the subject is the sum of the points that the student has achieved during the course (70% of the grade) and the points earned on the final exam (30% of the grade) according to the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka.
Continuous assessment:
Three colloquiums - a minimum of 50% of the estimated number of points is required -
Final exam:
The final exam (oral exam) checks the knowledge in the field of Simulator 2 - LNG ship - a minimum of 50% of points is required.

Examples of evaluation by individual outcome at the colloquium and final exam:
1. In the schematic representation of the LNG ship, identify and explain the function of the system
2. On the basis of the operating parameters diagnose the fault, perform proper system regulation
3.Evaluate local and remote indication of measured parameters, establish power system and prepare propulsion turbine for departure

1.10. Main Reading

User Manual Transas 5000
Presentation and lectures

1.11. Recommended Reading

LNG carrier instruction manuals

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
User Manual Transas 5000	50	45

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed, and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	Dr.sc. Dean Bernečić, full professor	
Course	On-board Training	
Study Programme	Marine engineering	
Level	Undergraduate	
Type of Course	Obligatory	
Year of Study	3	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	2
	Number of Hours (L+E+S)	0+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the exercises is to familiarize students with real ship systems, devices, life on board, and their future duties and tasks as an marine engineer officer. Students also learn about another type of propulsion through a diesel-electric propulsion (DE-DF) simulator model on an LNG ship.

1.2. Prerequisites for Course Registration

Attended courses Work on the simulator 1 and 2 and the right to pass them (more than 70% in class). 100% attendance on board and in the workshop is mandatory.

1.3. Expected Learning Outcomes

After completing the exercises, students will be able to:

1. Identify and start the propulsion plant on a marine engineering simulator with DE-DF propulsion.
2. Disassemble and assemble the oil separator, tube heat exchanger, turbo-blower, and other devices on which the exercises are performed, prepare and start the diesel engine,
3. Familiarize with the life on board and distinguish the responsibilities of individual crew members and perceive their future duties as a engine cadet and later as an engineer officer;
4. Recognize the actual implementation of the most important ship systems, see their location on board and compare the similarities between the real ship and the ship from the simulator and perform basic measurements,
5. Recall the structure of the ship's watch, the method of taking over the ship's watch and repeat the main parameters that are read and entered in the engine logbook during the watch, as well as become familiar with ship maneuvers.
6. Perform diesel engine servicing in operation and perform maintenance tasks on marine diesel engine components

1.4. Course Outline

Simulator training on a ship model with DE-DF propulsion. Workshop exercises in the Torpedo educational workshop on ship engines and ship equipment. Introduction to life on board, duties of individual crew members and duties of the engineer officer, and introduction to watchkeeping and ship maneuvering. Creation of the most important ship diagrams following the pipelines in the engine room (sea and fresh cooling water system, main and auxiliary engine oil system, ME and AE fuel oil system, steam production and distribution system). Measurement of the most important parameters of ship engine systems and recording them in the engine logbook.

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1.5. Modes of Instruction	☐ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☒ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	The onboard practice is organized by the Faculty depending on the possibilities and availability of individual Jadrolinija ships, JPS, "Viktor Lenac" Shipyard or some other shipping company or Torpedo educational workshop.	

1.7. Student Obligations

Mandatory attendance at classes and adherence to safety at work. On board, crew safety conditions and rules must be adhered to. Wearing protective footwear and clothing, protective gloves and a helmet is mandatory and it is recommended to carry a flashlight. Mandatory adherence to the pre-set schedule for engine room practice. For misconduct, the student will be removed from the ship in the first port of call at their own expense to return to their place of residence, and does not have the right to take the exam. Drunkenness and the use of opiates, disturbing the peace and order of the ship, fighting, etc. are considered misconduct.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1	Class participation	0.5	Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	0.5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Onboard practice is carried out in shifts of 2 or 4 hours 24 hours a day, and in one shift there are two students with continuous monitoring of the professor – onboard practice leader. Assessment and evaluation of students' work will be done on the basis of their efforts on board and evaluation of graphic programs. The development of graphic programs requires the commitment of students and the independent tracking of ship pipelines, the schemes development of default main ship systems and their subsequent presentation to other students. Students work in pairs and have to communicate and exchange knowledge with other students and try to solve individual problems together. The evaluation shall also take into account the application of the material covered in the course "Work on Simulator 1 and 2". The passage constitutes the sum of all the above criteria.
The subject is evaluated with P - Passed or N - Not passed

Onboard practice is carried out in shifts of 2 or 4 hours 24 hours a day, and in one shift there are two students with the continuous monitoring of the professor - onboard practice leader (if the practice is on board the ship). In the Torpedo educational workshop, classes are conducted on marine engines and mechanical equipment. Assessment and evaluation of students' work is done on the basis of their efforts on the ship (workshop) and by evaluating the creation of graphic programs. When creating graphic programs, students' commitment and independent monitoring of the ship's pipelines and their subsequent presentation in front of other groups is necessary. Students work in pairs, and they must communicate and exchange knowledge with other groups and try to solve problems together.
Exercises on the simulator have a knowledge check that carries 0.5 ECTS, and includes proper preparation of the engine plant. In the overall evaluation, the application of the material covered in the courses Work on the simulator 1 and 2 is taken into account. The final grade is the sum of all the mentioned criteria. The course is evaluated with P - Passed or F - Failed

1.10. Main Reading

[1] NOTE: 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. Use empty fields for additional activities.

D. Bernečić, R. Radonja; Praktikumi za vježbe te upute za rad na simulatoru; LITERATURA ZA RS 1 – MERLIN
Kongsberg Maritime: ERS, Machinery and Operation, Diesel Electric Dual Fuel LNG Carrier DE21;
J. Dujmović: Proces uspostave pogonskog sustava na simulatoru tankera za prijevoz UPP-a sa dizel-električnom porpulzijom

1.11. Recommended Reading

Instrukcione knjige s brodova,
Volvo Penta AB, Workshop manual, Group 21-26, Marine engines D3-110i-D…..D3-190A-B
Alfa Laval Tumba AB, Separator Manual, High Speed Separator MAB 130B-24
Mercedes Benz, Operating Instructions OM421/OM424LA
Operation Maunal – Wartsila D545 – Deutz BVM545
Vukelić, Goran; Ogrizović, Dario; Bernečić, Dean; Glujić, Darko; Vizentin, Goran; Application of VR Technology for Maritime Firefighting and Evacuation Training-A Review // Journal of marine science and engineering, 11 (2023.)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
		70

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information			
Head of Course			
Course	Bachelor of Science Thesis		
Study Programme	Marine Engineering		
Type of Course	Obligatory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		11
	Number of Hours (L+E+S)		

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the thesis paper writing and its successful presentation is to prove the student's capability:

- To apply both theoretical and practical knowledge acquired during the study
- To analyze actual domestic and foreign literature in the research and graduation theme writing process
- To analyze relevant scientific and technology findings, conclusions and facts published in the up to date literature
- To define and interpret graphics (tables, schemes, photos, drawings) in respect of applied research methodology

1.2. Prerequisites for Course Registration

Students gain access to registration for the course upon registration in sixth semester of the undergraduation study. Prerequisites for the registration are: successful completion of the courses from the fifth (winter) semester and lack of fifth semester courses exam application blockage.

1.3. Expected Learning Outcomes

After successful presentation of the graduation essay the student will be able to:

1. Compare and apply theoretical and practical knowledge acquired during study
2. Analyze and interpret the selected (given) theme and apply practical knowledge
3. Apply methodology and technology necessary to write the graduation essay
4. Present conclusions and findings in respect of selected theme and performed research within the essay

1.4. Course Outline

Undergraduation essay is an expert and scientific analysis of the defined theme. With this essay student proves its competencies and possession of learning outcomes in resolving problems in respect to the courses of the Marine engineering undergraduation study and successful application of theoretical and practical knowledge acquired during study. During the complete process student must prove competences in theoretical and practical knowledge in the field of marine engineering.
Graduation essay is, in general, written and presented in Croatian but, it could be in special circumstances written and presented in foreign language. The presentation is given to the mentor itself.

1.5. Modes of Instruction	☐ Lectures ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☒ Multimedia and Network ☒ Laboratory ☒ Mentorship ☒ Other (research, cooperation with the industry experts, analysis of practical examples and data…)
1.6. Comments		

1.7. Student Obligations

The student is obliged to write the essay using constant consultations with the mentor and successfully present the theme. The method of application, writing, presentation and evaluation of the process is defined by the Faculty's rules and regulations.

1.8. Assessment[1] of Learning Outcomes

Course attendance		Class participation		Seminar paper		Experiment	
Written exam		Oral exam	2	Essay		Research	4
Project	4	Continuous Assessment		Presentation		Practical work	
Portfolio						Other (research, cooperation with the industry experts, analysis of practical examples and data…)	1

[1] **NOTE:** 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

In accordance with University of Rijeka Application of student papers authenticity information system directive, the mentor must check authenticity of the graduation essay using *Turnitin (www.turnitin.com)* service. Based on the analysis, mentor completes the Report on authenticity – Appendix C and within states essay's data and the approval to continuation of the procedure. The mentor's positive mark and positive authenticity report are preconditions for the undergraduation theme presentation term determination. The theme presentation is given to the mentor. The mentor could ask questions about theoretical backgrounds of the essay, practical implementation or other themes not necessary connected directly with the theme (in general all marine engineering themes could be covered). The proceedings have written form in which all data from the proceeding are noticed.

Examples of learning outcomes evaluation:

1. Student gives a presentation in duration of approximately 10 mins about the essay (LO 1 – 4)
2. Student answers to the mentor question explaining the scheme from the essay (LO 1 – 4)

1.10. Main Reading

- Main reading for the course from which the undergraduation theme is selected
- Additional literature suggested by the mentor
- Undergraduation essay writing directions, editors: dr.sc. I. Kolanović, dr.sc. A. Perić Hadžić, dr.sc. Č. Dundović, dr.sc. I. Jurdana, dr.sc. I. Rudan, Pomorski fakultet u Rijeci, Sveučilište u Rijeci, Rijeka, 2014. – available at https://www.pfri.uniri.hr/web/hr/studij BS.php

1.11. Recommended Reading

- Recommended reading for the course from which the undergraduation theme is selected
- Additional literature suggested by the mentor

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Undergraduation essay writing directions, editors: dr.sc. I. Kolanović, dr.sc. A. Perić Hadžić, dr.sc. Č. Dundović, dr.sc. I. Jurdana, dr.sc. I. Rudan, Pomorski fakultet u Rijeci, Sveučilište u Rijeci, Rijeka, 2014. – available at https://www.pfri.uniri.hr/web/hr/studij BS.php	Available at *https://www.pfri.uniri.hr/web/hr/studij BS.php*	

1.13. Quality Assurance

Course quality review carried in accordance with ISO 9001 system and European standards and guidance for quality assurance carried through on Maritime faculty. Student Success is evaluated, and corrective measure implemented yearly.

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Course description

Generic information			
Head of Course	Mirjana Borucinsky, PhD		
Course	English Language VI		
Study Programme	Marine Engineering		
Type of Course	Elective		
Year of Study	3	Semester	6
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		3
	Number of Hours (L+E+S)		15+0+30

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to develop the students' writing skills in a specific working environment in English for Specific Purposes.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

The students are expected to be able to:
1. Complete the ship engineering documentation using specialized terminology.
2. Compose a CV in English.
3. Write a cover letter in English.
4. Compose and write correspondence and electronic mail in English.
5. Compose and translate notes, specifications and reports.

1.4. Course Outline

Writing letters, e-mail. Memorandums, circular letters and engine manufacturer notes. Examples of correspondence from ship engineering practice. Notes in the engine room log. Notes about the condition of the rings, pistons and grooves. Notes about the condition of the liner. Notes about measuring clearance and the condition of bearings. Notes about bearing and bolts inspection. Dry docking specifications.
Grammar: Language structures in orders, advice and recommendations, instructions, work specifications

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Class attendance, activities, continuous assessment and final exam (written and oral)

1.8. Assessment[1] of Learning Outcomes

[1] **NOTE:** 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. Use empty fields for additional activities.

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	0,5	Presentation		Practical work	
Portfolio	0,5	Final exam	0,5				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

60 % in class, 40 % at the final exam (outcomes 1-5).
Mid-term exam - 30 % (outcomes 1, 4).
Independent work (CV) – (10 %) (outcome 2)
Independent work (cover letter) (10 %) (outcome 3)
Activity in class (doing exercises in the learning platform Merlin) (10 %)
Final exam (40 %) (outcome 5)

Examples of assessment for each outcome in the mid-term exam

1. Complete the ship engineering documentation in English..
2. Compose letters or e-mails in English.

Examples of assessment for each outcome in the final exam:

1. Compose and translate notes, specifications and reports (complex notes in technical forms, requirements for spare parts and components acquisition)

1.1. Main Reading

Spinčić-Luzer: *Engleski u brodostrojarskim komunikacijama*, Adamić, III izdanje Rijeka 2007.

1.2. Recommended Reading

Borucinsky, M., Kegalj, J. 2020. Notes on Written Communication in Marine Engineering. Rijeka: Faculty of Maritime Studies.
Original correspondence from everyday communication
moodle.srce.hr

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Spinčić-Luzer: Engleski u brodostrojarskim komunikacijama, *Adamić, III izdanje Rijeka 2007.*	15	30

1.4. Quality Assurance

The quality of the course is monitored in accordance with the ISO 9001 system and the European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the course are analyzed and appropriate measures implemented accordingly.

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3.2. Course description

Generic information			
Head of Course	Goran Vizentin, PhD		
Course	Corrosion and material protection		
Study Programme	Marine engineering		
Type of Course	Elective		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30+15+0

1. GENERAL COURSE DESCRIPTION		
1.1. Course Objectives		
The objective of this course is to provide the student with the appropriate corrosion knowledge and protection of materials and systems prescribed by STCW and IMO Model Courses for the service of Naval Navigation Officer.		
1.2. Prerequisites for Course Registration		
None.		
1.3. Expected Learning Outcomes		
After passing the exam, students will be able to do the following: 1. State the basic physical and chemical properties of structural materials in terms of corrosion 2. Recognize and solve problems arising from the process of material degradation in industry 3. Describe the basic principles of corrosion theory 4. Choose an adequate ecological corrosion protection system 5. Describe the important factors in coating testing		
1.4. Course Outline		
Metal corrosion. Division of corrosion. Chemical corrosion and electrochemical corrosion. Definitions of corrosion, abrasion, erosion, mechanical fatigue and cavitation. Forms and mechanisms of corrosion. Corrosion of certain technical metals. Special forms of corrosion in the sea. Destruction of inorganic and organic materials. Corrosion protection. Technological prerequisites for good protection. Surface preparation. Protection methods. Cathodic protection. Corrosion tests. Protection efficiency test.		
1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

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1.7. Student Obligations

Class attendance (minimum 70%), solving assignments during class, writing reports.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation	0,5	Seminar paper		Experiment	
Written exam	0,5	Oral exam	1.5	Essay		Research	
Project		Continuous Assessment	1.5	Presentation	1,5	Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The process of evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Regulations on Studies at the Faculty of Maritime Studies in Rijeka in the following way:

1. through regular attendance and activity in class
2. continuous assessment of knowledge through preliminary exams 70 points
3. final exam 30 points (min. 15 points)

TOTAL: 100 points or 100%.

Examples of assessment of learning outcomes in relation to the set learning outcomes are:

1. Explain corrosion of metals.
2. Explain the division of corrosion.
3. Explain chemical and electrochemical corrosion.
4. Explain the corrosion of individual technical metals.
5. Explain the special forms of corrosion in the sea.
6. Explain the basic corrosion protection procedures.
7. Explain basic cathodic protection procedures.
8. Describe the basics of corrosion testing and protection effectiveness testing.
9. Explain methods of testing the effectiveness of protection.

1.10. Main Reading

Juraga, I.; Alar, V.; Stojanović, I.: Korozija i zaštita premazima

1.11. Recommended Reading

1. Stupnišek–Lisac, E.: Korozija i zaštita konstrukcijskih materijala, FKIT, Zagreb, 2007.
2. Esih, I.: Osnove površinske zaštite, Fakultet strojarstva i brodogradnje, Zagreb, 2003.
3. E. McCafferty, Introduction to Corrosion Science, Springer, New York, 2010.
4. I. Esih, Z. Dugi, Tehnologija zaštite od korozije, Školska knjiga Zagreb, 1989.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
	0	

1.13. Quality Assurance

According to ISO 9001 system set at Faculty of Maritime Studies, Rijeka. Once a year analysis of passing exam rate. Once a semester anonymous students online survey.

[1] NOTE: 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. Use empty fields for additional activities.

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3.2. Course description

Generic information		
Head of Course	PhD Mirano Hess	
Course	Ship navigation	
Study Programme	Marine Engineering	
Type of Course	Optional course	
Year of Study	3	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	3
	Number of Hours (L+E+S)	15 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

To equip students with the understanding of navigation elements, terrestrial navigation methods, electronic navigation systems, meteorological and oceanographic factors affecting navigation routes, and the application of navigation procedures and ship position determination.

1.2. Prerequisites for Course Registration

/

1.3. Expected Learning Outcomes

After completing the course, students will be able to:

1. Define, calculate, and illustrate elements of maritime navigation.
2. List and explain elements of cartography, nautical charts, and publications.
3. Explain and compare elements of tides and ocean currents.
4. Identify and highlight the similarities and differences between rhumb line and great circle navigation.
5. List and differentiate navigational devices and electronic navigation systems.

1.4. Course Outline

1. Navigation elements: geographic coordinates, ship's course, azimuth, heading angle.
2. Orientation at sea: determining course and distance, magnetic compass.
3. Cartography: types and classification of projections, Mercator chart.
4. Geometric foundations of ship position: determining lines of position, types of positions, calculating speed and distance traveled.
5. Plotting courses on nautical charts.
6. Tides and ocean currents.
7. Rhumb line and great circle navigation.
8. Electronic navigation systems: satellite navigation, radar, electronic charts, speedometer, depth sounder, integrated navigation systems.

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1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☐ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Attendance in classes. Passing an in-course colloquium and a final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation		Seminar paper		Experiment	
Written exam	0.5	Oral exam		Essay		Research	
Project		Continuous Assessment	1	Presentation		Practical work	
Portfolio							

[1] **NOTE:** 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. Use empty fields for additional activities.

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

70% in-class assessment and 30% final exam (according to the University of Rijeka Study Regulations and the Faculty of Maritime Studies of Rijeka Study Regulations). Continuous assessment: colloquium on course material, minimum 50% of grade points required (I1, I2). Final exam: written exam on course material, minimum 50% of grade points required (I3, I4, I5).
Examples of Learning Outcome Assessments:

1. A ship departed from port A (ϕ=41°26´S; λ=117°31´E) at 13:10. At 20:05, the coordinates changed by Δϕ= 35.9´ N and Δλ= 24.3'W. Calculate the ship's position at 20:05. (I1)
2. Explain which chart (map projection) and why it is commonly used as a navigational chart. (I2)
3. Describe the procedure (how it is done in practice) to accurately calculate sea depth at a specific time in a specific port. (I3)
4. Identify the similarities and differences between rhumb line and great circle navigation. (I4)
5. Explain how an ultrasonic speedometer works and measures ship speed. (I5)

1.10. Main Reading

1. Hess, M.: Plovidba broda, 2025, na Merlinu (https://moodle.srce.hr).

1.11. Recommended Reading

1. Simović, A.: Terestrička navigacija, Školska knjiga, Zagreb, 2000.
2. Simović, A.: Elektronička navigacija, Školska knjiga, Zagreb, 2000.
3. Grupa autora: Vademecum maritimus, Pomorski fakultet, Rijeka 2014.
4. Kos, S., Vranić, D., Zorović, D.: Elements of electronic navigation for deck officers and masters, Faculty of Maritime Studies Rijeka, Rijeka, 2005.
5. Bowditch, N.: American Practical Navigator, National Geospatial-Intelligence Agency, Springfield, 2024.
6. Znakovi i kratice na HR pomorskim kartama, Hrvatski hidrografski institut, Split, 2013.
7. Tablice morskih mijena - Jadransko more - Istočna obala, Hrvatski hidrografski institut, Split, 2025.
8. Kos, S., Filjar, R., Hess, M., Differential equation of the loxodrome on a rotational surface. ION 2009, International technical meeting. The Institute of Navigation, ION, Manassas, Virginia, USA, Anaheim, California, USA, January, 2009, str. 958-960.
9. Kos, S., Hess, M., Hess, S., Trends in ship routing and scheduling. Proceedings of the 15th International Symposium on Electronics in Traffic, ISEP '07: Applications of Intelligent Transport Systems. Electrotechnical Association of Slovenia, Ljubljana, Slovenia, May, 2007, str. M1.
10. Kos, S., Hess, M., Hess, S. (2007) Procedures reducing the impact of risks on shipping company operations. Suvremeni promet. HZDP Zagreb. 27(5): 300-304.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Hess, M.: Plovidba broda, 2025, na Merlinu (https://moodle.srce.hr).	Unlimited	20

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies University of Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	**Livia Maglić, PhD**	
Course	Material handling equipment	
Study Programme	Marine Engineering	
Type of Course	Elective	
Year of Study	3	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The primary objective of this course is to familiarise students with material handling equipment and their operational characteristics, depending on the type of cargo and handling methods.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

Upon successful completion of the course, students will be able to:

1. Define fundamental concepts such as transport, transfer, transhipment, and material handling equipment.
2. Categorise material handling equipment according to cargo type and technological transhipment process.
3. Explain and identify factors that determine the operational characteristics of material handling equipment.
4. Compare and provide examples of the application of different types of material handling equipment depending on the technological transhipment process.
5. Explain the methods for evaluating, selecting, and determining the required number of material handling equipment.
6. Recognise and interpret the importance of safety aspects when working with material handling equipment.
7. Calculate productivity, determine power class, stability, and load of port material handling equipment, and interpret the results.

1.4. Course Outline

Concepts of transport, transfer, and transhipment. Types and basic characteristics of material handling equipment. Productivity of material handling equipment. Determining power class, rated capacity, and working speeds of cranes. Load handling devices. Documentation, inspection, and testing of cranes. Safety measures when working with cranes.

1.5. Modes of Instruction		
	☒ Lectures	☐ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network
	☒ Exercises	☐ Laboratory
	☐ E-learning	☐ Mentorship
	☒ Field work	☐ Other _____

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1.6. Comments	

1.7. Student Obligations

1. Passing two colloquiums
2. Final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1,0	Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

[1] NOTE: 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. Use empty fields for additional activities.

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1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Assessment of learning outcomes is conducted according to the University of Rijeka and Faculty of Maritime Studies regulations as follows:

- Continuous assessment: 70% of learning outcomes are evaluated through two colloquiums (1st: outcomes 1-4, 35%; 2nd: outcomes 5-7, 35%)
- Final exam: 30% of learning outcomes (1-7) are evaluated, with a minimum of 50% required to pass.

Examples of assessment tasks:

1. Explain the concept of material handling equipment.
2. What are the basic quantities in material flow technology? Explain their significance for cargo transfer in continuous transport.
3. List the main criteria for classifying material handling equipment and provide examples for each category.
4. Based on a given numerical example, calculate the utilisation coefficients of the rated capacity of material handling equipment and explain their significance for operation.
5. Explain the path relation as an indicator for evaluating the operation of material handling equipment.
6. List and describe safety measures when working with cranes.
7. Calculate the theoretical and operational productivity of material handling equipment based on a given numerical example and interpret the results.

1.10. Main Reading

- Predavanja predmetnog nastavnika dostupna na sustavu za e-učenje- Merlin
- Dundović, Č., Prekrcajna sredstva prekidnog transporta, sveučilišni udžbenik, Pomorski fakultet u Rijeci, Rijeka, 2005.
- Mavrin, I., Transporteri, Fakultet prometnih znanosti, Zagreb, 1999.

1.11. Recommended Reading

- Maglić, L. Optimizacija raspodjele kontejnera na slagalištu lučkoga kontejnerskog terminala, doktorska disertacija, 2015.
- Burič, A.M., Zbirka riješenih zadataka iz pretovarne mehanizacije, Univerzitet Crne Gore, Podgorica, 2010.
- Vladić, J., Transportna i pretovarna sredstva i uređaji: neprekidni i automatizovani transport, Fakultet tehničkih nauka, Novi Sad, 2005.
- Vladić, J., Mehanizacija i tehnologija pretovara: neprekidni transport i specifične mašine i uređaji, Fakultet tehničkih nauka, Novi Sad, 2005.
- Bukumirović, M., Zbirka riješenih zadataka iz elemenata transportnih sredstava i uređaja 2, Univerzitet u Beogradu, Saobraćajni fakultet, Beograd, 2003.
- Matić, A., Prekrcajna sredstva u pomorskom transportu 1, Veleučilište u Dubrovniku, Dubrovnik, 2000.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Dundović, Č., Prekrcajna sredstva prekidnog transporta, sveučilišni udžbenik,Pomorski fakultet u Rijeci, Rijeka, 2005.	6	70
Mavrin, I., Transporteri, Fakultet prometnih znanosti, Zagreb, 1999.	6	70

1.13. Quality Assurance

The quality of the study is continuously monitored following the ISO 9001 system and in line with European standards and guidelines for quality assurance, as implemented at the Faculty of Maritime Studies, University of Rijeka. Annual exam analysis is conducted, and student surveys are carried out each semester.

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3.2. Course description

Generic information			
Head of Course	Dr.sc. Dean Bernečić, full professor		
Course	Liquid Cargo Transport Technology (LCTT)		
Study Programme	Marine engineering		
Level	Undergraduate		
Type of Course	Elective		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		45+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Lectures and exercises on a very large crude oil tanker (VLCC) cargo handling simulator will introduce students to liquid cargo systems on oil tankers, chemical tankers and liquefied gas tankers, cargo properties, hazards, hazard control, safety equipment, pollution prevention, cargo handling equipment and basic cargo operations and precautions.

1.2. Prerequisites for Course Registration

There are no prerequisites. It is advisable to listen to and passed the main exams of the future profession (Marine Engines, Marine Auxillary Systems, Marine Steam Generators, Marine Turbines, Marine auxiliary equipment).

1.3. Expected Learning Outcomes

After learning, the student will be able to:
1. Distinguish between different types of tanks on LNG and LPG ships and recognize the basics of their construction and the type and construction of cargo handling equipment;
2. Describe the construction of the hull and equipment, as well as the construction of tanks and cargo equipment on a type 1 chemical tanker with special emphasis on the Framo hydraulic system;
3. Describe the construction of the hull and equipment, as well as the construction of tanks and cargo equipment on a very large crude oil tanker (VLCC) with special emphasis on the inert gas system (I.G.S.) and the tanks crude oil washing system (COW) as well as cargo tanks sea water washing system (S.W.W.);
4. Distinguish between different inert gas systems depending on the ship on which they are applied, and compare their basic characteristics;
5. Describe cargo handling procedures on different types of tankers with special emphasis on crude oil and oil products tankers;
6. Describe the procedure for preparing a tanker for docking;
7. Explain procedures in emergency situations;
8. Describe the duties of an engineer officer at both operational and management levels in a safe and responsible manner.

1.4. Course Outline

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Introduction, basic terminology, types of cargo, rules and regulations;
Basic physical and chemical properties of liquid cargo;
Fire hazard, health and environmental hazards, reactivity hazard, corrosion hazard;
Hazard monitoring, cargo safety patterns, ways of controlling the potentially dangerous atmosphere on tankers;
Safety equipment and protection of persons, safety measuring instruments, dedicated fire fighting equipment, breathing apparatus;
Entry procedures for tanks and enclosure spaces, rescue and abandonment equipment, protective equipment and clothing, resuscitation devices, precautions and security measures, cargo spill procedures, SOPEP, ship / terminal connection;
Ship construction and cargo handling equipment for oil tankers, cargo tanks, cargo pipelines, valves for cargo systems, ventilation;
Ship construction and cargo handling equipment for chemical tankers, cargo tanks, cargo pipelines, valves for cargo systems, tank and layer materials, tank clearance, cargo heating systems;
Ship construction and cargo handling equipment on liquefied gas carriers, liquefaction and evaporation control systems, heat exchangers;
Inert gas systems, operations, measuring, indicators and alarms, system performances, system elements, maintenance and checks;
Tank washing systems, system designs, pipelines, tank washing machines, drying system, washing process;
Cargo operations, awareness of the dangers involved in carrying out cargo operations on tankers;
Pumps and piping systems for liquid cargo tankers;
Emergency procedures, emergency measures, organizational structure, alarms, procedures.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☒ Field work	☐ Practical work ☐ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments		

1.7. Student Obligations

Mandatory min. attendance of 75% at lectures and exercises and (or) field training.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	
Project		Continuous Assessment	2	Presentation		Practical work	
Portfolio		Final exam	1				

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

Assessment and evaluation of students' work included through three (3) colloquiums and simulator work checking. Each colloquium includes a particular group of tankers. Colloquiums and checking work on the simulator are valued at 0.5 ECTS. The final exam includes checking the entire material and work on the simulator, in accordance with the STCW 73/78 Convention, and carries 1 ECTS point. It is also possible to conclude a grade based on the results of colloquiums and work on the simulator without a final exam.
Colloquium 1 (I1, I4, I5, I6, I7, I8)
Colloquium 2 (I2, I4, I5, I6, I7, I8)
Colloquium 3 (I3, I4, I5, I6, I7, I8)
Example of evaluation on the simulator:

[1] NOTE: 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. Use empty fields for additional activities.

Properly prepare and start cargo oil turbo-pumps (I3, I5),
Prepare and start the inert gas system (I4, I5),
Example of evaluation on colloquiums and/or final exam:
Specify the types of liquid cargo tanks and explain the construction on LNG/LPG ships (I1),
Recognize and identify the advantages and disadvantages of membrane tanks (I1, I7).

1.10. Main Reading

D. Bernečić, LITERATURA ZA TTTT – on MERLIN web site

1.11. Recommended Reading

Instructional books from ships;
Regulations relating to the safety of tanker navigation and pollution prevention, Faculty of Maritime Studies Rijeka.
Fire protection on ships, Faculty of Maritime Studies Rijeka.
Tanker Safety, Faculty of Maritime Studies Rijeka.
Transport of liquefied gas by sea, Faculty of Maritime Studies Rijeka.
Chemical Tankers, Faculty of Maritime Studies Rijeka.
Inert Gas System and Crude Oil Washing, Faculty of Maritime Studies Rijeka.
Poljak, Igor ; Orović, Josip ; Mrzljak, Vedran ; Bernečić, Dean; „Energy and Exergy Evaluation of a Two-Stage Axial Vapour Compressor on the LNG Carrier“, Entropy (2020.).

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
		70

1.13. Quality Assurance

The quality of study is monitored in accordance with the ISO 9001 system and in accordance with European standards and guidelines for quality assurance carried out at the Faculty of Maritime Studies in Rijeka. Once a year, the results of the transience are analysed and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	Marko Gulić, PhD	
Course	**Business Information Systems**	
Study Programme	**Marine Engineering**	
Type of Course	**Elective**	
Year of Study	**3rd**	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	**30+15+0**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Acquiring knowledge about the ship's information system as part of the shipowner's information system. Familiarization with the inclusion of computers in the ship's various technological processes and their integration into the ship's unique information system

1.2. Prerequisites for Course Registration

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1.3. Expected Learning Outcomes

After attending and passing the course, students will be able to:
1. Explain data organization and its application in information systems.
2. Identify the components and functions of a ship's information system.
3. Describe the methods of integrating ship systems into an information system.
4. Analyse the architecture of onboard computer networks.
5. Apply information systems to optimize technological processes on a ship.
6. Use MS Access to manage and organize data.

1.4. Course Outline

Presentation and organization of data. Databases. Computer tasks in the automation of ship technological processes. Ways to include computers in process management. Signals. Basic circuit elements required for computer control. Ship computer network. Application of computers on board. Application in maintenance. The ship's integrated information system. Information system of shippers.

1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☒ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☐ Multimedia and Network ☒ Laboratory ☐ Mentorship ☐ Other _____
1.6. Comments	-	

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1.7. Student Obligations

- Regularly attend classes (lectures and exercises)
- Take the 1st and 2nd midterm exams
- Take the final (oral) exam if the conditions for attendance are met

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam		Essay		Research	
Project		Continuous Assessment	1,5	Presentation		Practical work	
Portfolio							

1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

The procedure for evaluating the acquired learning outcomes is carried out according to the Regulations on Studies of the University of Rijeka and the Rulebook on Studies at the Faculty of Maritime Studies in Rijeka as follows:

- Continuous knowledge assessment during classes accounts for 70% of the achieved learning outcomes:
  – Midterm Exam 1 – Learning Outcomes 1–3 (30%)
  – Midterm Exam 2 – Learning Outcomes 4–5 (30%)
  – Independent assignments during exercises – Learning Outcome 6 (10%)
  In each midterm exam, the student must achieve a minimum of 50% of the total points.
- The final (oral) exam accounts for 30% of the achieved learning outcomes (1–6), and the student must achieve a minimum of 50% of the points on the final exam to pass.

Examples of evaluating learning outcomes respecting set learning outcomes are:

1. Explain the organization of data in a ship's information system.
2. List the components of a ship's information system and describe their functions.
3. Describe the process of integrating ship systems into an information system.
4. Draw and analyze the architecture of a shipboard computer network.
5. Propose an optimization model for the maintenance of ship systems.
6. Create a database in MS Access to track fuel consumption.

1.10. Main Reading

- Tudor M., Tudor I., Pomorski informacijski sustavi, Sveučilište u Rijeci, Pomorski fakultet, Rijeka, 2022. (the book is available on the e-learning platform Merlin, https://moodle.srce.hr)
- Course materials are available on the e-learning platform Merlin (https://moodle.srce.hr)

1.11. Recommended Reading

- Pavić, M. Razvoj informacijskih sustava, Znak, Zagreb, 1996.
- Smiljanić, G. Sadašnje stanje upotrebe elektroničkih računala na brodovima, Školska knjiga, Zagreb, 1991.
- Tudor, M. ; Martinović, D. Primjena računala u održavanju broda, Zbornik radova Pomorskog fakulteta, (Biličić, M. urednik), Sveučilište u Rijeci, Pomorski fakultet u Rijeci, Rijeka, 1997, pp. 49-59.

[1] NOTE: 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. Use empty fields for additional activities.

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- Tudor, M. Promjena računala u dijagnostici kvarova, Zbornik radova Pomorskog fakulteta, (Biličić, M. urednik), Sveučilište u Rijeci, Pomorski fakultet u Rijeci, Rijeka, 1998, pp. 187-195.
- Tudor, M.; Vlahinić, I.; Martinović, D. Selection of Ship Maintenance Strategy Applying the Computer, Naše More, (Lovrić, J. editor), god. 45, br. 1-2/98, Dubrovnik, 1998. pp. 26-32.
- Grundler, D. Primjenjeno računalstvo, Graphis, Zagreb, 2000.
- Tudor, M. Modeliranje integriranog informacijskog sustava nadzora brodskih procesa s gledišta održavanja,
- Pomorski fakultet u Rijeci, Sveučilište u Rijeci, doktorska disertacija, Rijeka, 2006.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Tudor M., Tudor I., Pomorski informacijski sustavi	unlimited	20
E-course teaching materials available on the Merlin e-learning system	unlimited	20

1.13. Quality Assurance

The quality of studies is continuously monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. At the end of each semester, an anonymous evaluation of the quality of instruction is conducted by the students. Additionally, an annual analysis of student success in the course is performed (the percentage of students who passed the course and their average grades).