Sveučilište u Rijeci • University of Rijeka
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T: (051) 406-500 • F: (051) 216-671; 216-091
W: www.uniri.hr • E: ured@uniri.hr

3.2. Course description

Generic information		
Head of Course	Marko Gulić, PhD	
Course	Advanced Programming	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
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

The course provides a fundamental understanding of programming approaches, concepts, and techniques, with a special emphasis on modular program construction. Topics covered include algorithm development, the use of programming languages to write simple code, and the identification and correction of programming errors. Students will also become familiar with commonly used algorithms and programming techniques using a specific programming language.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Apply basic principles of program design.
2. Develop and write a simple program, and understand and resolve compiler errors.
3. Develop algorithms using programming language constructs for controlling program flow.
4. Describe use cases of specific program flow control using appropriate algorithm examples.
5. Write a program that uses arrays for data storage.
6. Analyze parts of a given algorithm and implement them within functions.
7. Write a program that uses one or more data structures.

1.4. Course Outline

Basics of the programming language (variables and assignment, input and output, data types and expressions, debugging programs). Statements for controlling program flow (IF-ELSE statement, nested IF statement, extended IF-ELSE using ELSE IF block, SWITCH statement). Loops: WHILE, DO-WHILE, and FOR. Arrays. Structures. Strings. Functions. Files.

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	Classes are conducted through a combination of classroom instruction and individual work in the computer laboratory. Upon enrolment in the course, students will be directed to use the online learning platform. A detailed schedule of lectures and exercises will be published in the course implementation plan.

1.7. Student Obligations

- Regularly attend classes (lectures and exercises) and take short quizzes at the beginning of each exercise session
- Take the 1st and 2nd midterm exams
- Take the final (written/oral) exam if the requirements for attendance and assessment have been met

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							

1.9. 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 assessment during classes accounts for 70% of the achieved learning outcomes:
  – Midterm Exam 1 – Learning Outcomes 1–4 (30%)
  – Midterm Exam 2 – Learning Outcomes 5–7 (30%)
  – Quick quizzes during exercises – Learning Outcomes 1–7 (10%)
  In each midterm exam, the student must achieve at least 50% of the total points.

- The final (oral) exam accounts for 30% of the achieved learning outcomes (1, 3-7), and the student must achieve at least 50% of the points on the final exam to pass.

Examples of assessment tasks aligned with learning outcomes:

1. Design and write in a programming language the basic parts of an algorithm to calculate the area of a square.
2. Identify errors within the written algorithm for calculating the area of a square and correct them.
3. Design and write an algorithm that checks whether an entered number is positive, negative, or zero.
4. Describe a use case of a DO-WHILE loop with an appropriate algorithm example.
5. Design and write a program that inputs 20 numbers and displays all numbers greater than the arithmetic mean of those numbers.
6. Design and write a function to calculate the factorial of a given number passed from the main program.
7. Design and write a program that stores data about students (first name, last name, ID number, and study average) in a given structure. Furthermore, the program should display only the data of those students whose study average is less than 2.5.

[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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1.10. Main Reading

• Julijan Šribar, Boris Motik: Demistificirani C++, Dobro upoznajte protivnika da biste njime ovladali, 5th revised editionElement, Zagreb, 2018.

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

1.11. Recommended Reading

• Ali Arya: Anyone Can Code: Algorithmic Thinking, CRC Press, 2020.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Julijan Šribar, Boris Motik: Demistificirani C++	2	
E-course teaching materials available on the Merlin e-learning system	unlimited	

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	Robert Baždarić, Ph.D.		
Course	Automation of ship systems		
Study Programme	Marine Electronic Engineering and Information Technology		
Type of Course	Mandatory		
Year of Study	3.		
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 objectives of the course are to acquire basic knowledge and general insights into the field of automation of ship systems, with a focus on the application of automatic control and regulation in these systems.

1.2. Prerequisites for Course Registration

Fundamentals of Electrical Engineering I, Fundamentals of Electrical Engineering II and Fundamentals of Automation.

1.3. Expected Learning Outcomes

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

1. Classify ship processes under the aspect of automation.
2. Explain the hierarchical levels of automation of ship systems, taking into account the degree of autonomy, safety and reliability.
3. Explain the requirements of the registers in relation to the availability of management, alarm and protection systems.
4. Discuss the automatic control system.
5. List and briefly discuss the basic requirements placed on automatic regulation systems.
6. Analyze the different control systems of ship systems and represent them block by block using a typical block algebra.
7. Formulate an experimental algorithm to tune different PID controllers of ship processes.
8. Analyze the main ship processes related to propulsion, navigation and communication, power generation, services for propulsion and power generation, i.e. energy conversion, cargo manipulation, protection and alarm systems, automation systems for living spaces and comfort, from the point of view of automation.

1.4. Course Outline

Historical development of the automation of ship systems. The technical and economic aspect of ship automation. Evaluation, installation and operation of ship management systems. Classification and basic characteristics of automation systems on board, regulations, rules and requirements of classification societies. Ship systems. Insights into the main components of ship control systems: Transmitters, controllers and actuators. Linear and non-linear systems. Continuous and discrete control systems. Algorithms for controlling ship processes. Introduction and use of technical documentation. Automation of auxiliary engines. Automation of generators. Automation of power plants. Automation of main propulsion engines. Automation of auxiliary systems. Automatic course control system. Automated cargo handling system. General review and analysis of the application of automation of ship systems on ships in accordance with STCW and IMO.

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

Attend classes, actively participate, 1st colloquium, 2nd colloquium and examination.

1.8. Assessment[1] of Learning Outcomes

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

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:

- 1st colloquium 25%, learning outcomes 1-5
- 2nd colloquium 25%, learning outcomes 5-8
- Test 1, 10%, learning outcomes 3-8
- Test 2, 10%, learning outcomes 3-8
- Final examination, learning outcomes 1-8.

In the final part of the examination, 30% of the acquired learning outcomes are assessed, whereby the student must achieve at least 50% of the points in the final examination in order to pass the course. Participation in the exercises and lectures is compulsory and student attendance is monitored. A student may miss a maximum of 30% of the lessons. Depending on the student's success in continuous assessment, the student may earn the right to be exempted from assessment in the final exam.

Examples of the assessment of defined learning outcomes are:

1. Classify the automatic systems on ships according to their purpose.
2. Explain the phases of ship automation and their characteristics in relation to the control and regulation devices.
3. How can the power supply of the main ship systems be safely automated in terms of distribution and voltage diversity?
4. How can the degradation of automatic control be safely automated in terms of autonomy and explained on the ruder control system?
5. What is the basic requirement for any automatic regulation system?
6. Using block algebra, describe the automatic regulation of the heavy fuel oil heating process and give the basic variables with their physical names and units.
7. Determine experimentally the parameters of the PID regulation of the generator excitation, write down the procedure and express it in standardized parameters.
8. Name and explain the basic regulation processes of a steam generator.

1.10. Main Reading

1. Tomas, V., Valčić, M.: Automatizacija brodskih sustava, autorizirana predavanja, Pomorski fakultet u Rijeci, Rijeka, 2016.
2. Antonić, R.: Automatizacija broda II, Pomorski fakultet u Splitu, Split, 2005.
3. Antonić, R.: Brodsko automatsko upravljanje, Pomorski fakultet u Splitu, Split, 2010.

1.11. Recommended Reading

1. Vukić, Z., Kuljača, Lj.: Automatsko upravljanje – analiza linearnih sustava, Kigen d.o.o, Zagreb, 2004.
2. Fossen, T.I.: "Marine Control Systems - Guidance, Navigation and Control of Ships, Rigs and Underwater Vehicles", Marine Cybernetics, Trondheim, Norway, 2002.
3. Lin, C.F.:Modern Navigation, Guidance, and Control Processing, Practice Hall, Inc.,1991.
4. K-Sim ERS L11 5L90MC - VLCC Version MC90-V, Operator's Manual, Part 3: Machinery & Operation, Kongsberg Maritime, Norway, 2014.
5. Lyngso Marine MOS/MCS 2200 Monitoring System Denmark, 2005.
6. NACOS Platinum Operating Instructions ED 3100 G 150 / 02 (2011-07)
7. Baždarić, R., Škrjanc, I., & Matko, D. (2016). Two degrees of freedom in the control of a DC-DC boost converter, fuzzy identified explicit model in feed-forward line. *Journal of intelligent & robotic systems, 82*, 479-493.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

Tomas, V., Valčić, M.: Automatizacija brodskih sustava, autorizirana predavanja, Pomorski fakultet u Rijeci, Rijeka, 2016.	Web (e-classroom Merlin)	59
Antonić, R.: Automatizacija broda II, Pomorski fakultet u Splitu, Split, 2005.	4	59
Antonić, R.: Brodsko automatsko upravljanje, Pomorski fakultet u Splitu, Split, 2010.	*.pdf, online	59

1.13. Quality Assurance

The method of monitoring the quality of the programme is governed by mechanisms developed and applied at institutional level (in accordance with ISO 9001 at the Faculty of Maritime Studies).

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3.2. Course description

Generic information			
Head of Course	**dr. sc. Zoran Mrak** **dr.sc. Sanjin Valčić**		
Course	**Basics in electronic communications**		
Study Programme	Marine Electronic Engineering and Information Technology		
Type of Course	Compulsory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		5
	Number of Hours (L+E+S)		45 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objectives of this unit are to familiarize students with the fundamentals of operation of individual components of electronic communication systems (transmitters and receivers) as prescribed by the STCW Convention and IMO Model Courses for the service of Electro Technical Officers.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

Upon completion of the requirements for this course, students are expected to be able to:

1. Define types of information.
2. Describe individual types of harmonic oscillators.
3. Explain the differences between oscillators and frequency synthesizers.
4. Describe and analyze PLL frequency synthesizers.
5. Describe electronic filters.
6. Describe various modulation and demodulation techniques.
7. Describe methods of analog-to-digital signal conversion.
8. Describe signal mixing circuits.
9. Compare and describe different radio device concepts.

1.4. Course Outline

Information; sources and types of information. Block diagram of the communication system. Communication channel and noise. Fourier analysis and signal frequency spectrum. Analog and digital communications. Transmitter block diagram: Power systems, low frequency amplifier, carrier wave generator, modulator, decoupling stage and power amplifier. Frequency synthesizer. Amplitude, frequency and phase modulation, single-side band transmission. Digital Communications, PCMs, message encoding, digital modulation, digital information transfer rate, time and frequency multiplex. Receiver block-diagram; input oscillator circuits, local oscillator and mixer, intermediate frequency amplifier, demodulator and low frequency amplifier. Spread spectrum transmission 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		

1.8. Assessment[1] of Learning Outcomes

Course attendance	2,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project		Continuous Assessment	1	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 total number of credits consists of 10% attendance and teaching activity, 40% achieved through continuous assessment, laboratory report 20% and 30% at the final exam (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:
- 1st colloquium, written test 20 questions, learning outcomes 1-5 (20%)
- 2nd colloquium, written test 20 questions, learning outcomes 6-9 (20%)
- Laboratory report, learning outcomes 1-9 (20%).

Final exam:
- final exam is oral, learning outcomes 1-9 (30%).

Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. Describe the difference between discrete and continuous signals.
2. Give examples of the use of relaxation frequency generators.
3. Describe the role of individual elements in the Colpitts oscillator.
4. List the benefits of using a frequency synthesizer.
5. Explain how to generate the desired frequency with the PLL synthesizer.
6. Describe the FSK modulation technique.
7. Describe the PCM mode of analog to digital signal conversion.
8. Description of operation of a double balanced mixer.
9. Explain the difference between a 1st and 2nd order low-pass filter.

1.10. Main Reading

Roddy D., Coolin J.: "ELECTRONIC COMMUNICATIONS", Lakehead University, Ontario, Canada, Reston Publishing Co., 1984
Young:P. H. "ELECTRONIC COMMUNICATION TECNIQUES", Charles E. Merril Publishing Co., Columbus, Ohio 43216, 1985

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1.11. Recommended Reading

Modlic B., Modlic I.: "TITRANJE I OSCILATORI", Školska knjiga, Zagreb, 1991
Modlic B., Modlic I.: "MODULACIJE I MODULATORI", Školska knjiga, Zagreb, 1994
Gregg W. D.: "ANALOG AND DIGITAL COMMUNICATION", John Willey & Sons, New York, 1986
Sušanj, J.: Tehnički temelji GMDSS sustava, Pomorski fakultet, Rijeka, 1995.
Gregurić, M.: Radio-prijemna tehnika, Školska knjiga, Zagreb, 1980

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the Merlin e-learning system	unlimited	
Literature available at the Faculty Library	6	

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 insurance quality that is implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of transience are analyzed and yielded appropriate measures.

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3.2. Course description

Generic information			
Head of Course	Jasmin Ćelić, PhD		
Course	Computer management of ship systems		
Study Programme	Marine Electronic Engineering and Information Technology		
Type of Course	Compulsory		
Year of Study	3.		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4	
	Number of Hours (L+E+S)	30+30+0	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are to gain knowledge of the basic principles and techniques in the design and operation of process computers in control systems used in navigation.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Demonstrate the historical development of ship automation and the expected improvements
2. To show and explain the stages of development of computer control systems and specific problems
3. Define the methods by which management systems are valued
4. Demonstrate ways of connecting processes and computers, and ways of forming the hardware structure of PLC and SCADA systems.
5. Describe software support and how to install the program in the ship's control systems
6. Describe the basic input / output components of a ship's computerized control systems
7. Demonstrate different performances of the process control algorithm for ship systems
8. Demonstrate the operating principles of the automation of individual ship systems

1.4. Course Outline

Historical development of ship automation and expected improvements. Development of computer control systems and specific problems. Process management. Computer process management (historical development, basic functions of computers in process management, direct digital management, planning management, supervisory management, hierarchical process management using computers, centralized and distributed computer management). Real-time computer systems. Connecting Processes and Computers. Programmable logic controller - PLC. SCADA systems. Examples of systems for monitoring, managing and collecting data on board.

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

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1.6. Comments	

1.7. Student Obligations

1st preliminary exam, 2nd preliminary exam, design and presentation of a research assignment in an hour of exercises, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper	0,5	Experiment	
Written exam	0,5	Oral exam	0,5	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

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

- through continuous assessment of knowledge during class 70% of the acquired learning outcomes are assessed. Those include: 1st semester preliminary exam (midterm) - learning outcomes 1-4 (25%), 2nd semester preliminary exam (midterm) - learning outcomes 5-8 (25%), presentation of the research assignment (seminars) - learning outcomes 1-8 (20%); the student must score at least 50% of points in each midterm, while the presentation of the research assignment is evaluated on the basis of elaborated evaluation criteria;
- 30% of the obtained learning outcomes (1-8) are evaluated at the final exam, with the student having to complete at least 50% of points for passing the final exam.

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

1. Areas of improvement and factors contributing to the development of ship automation and their impact
2. Development cycle and specific difficulties in developing a new management system
3. Postulates describing the procedures, relationships and logic of the guidance system
4. Types of process signals at the transmission line interface and the process computer
5. Interaction of the basic processing unit, the process controller and the parent guidance system
6. What is a PLC, its structure, what is a scene cycle, ways of programming a PLC
7. Ways and measures to eliminate the effect of interference on process signals (distortion)
8. Level 4 and Level 5 functional systems may perform all or some of the functions of a multi-hierarchical control system
9. Level measuring and handling system (operating principle, features, configurations)
10. DATA BRIDGE Navigation System (Features, Configurations, Attached Navigation Instruments)

1.10. Main Reading

1. V. Tomas, Computer management of ship systems, authorized lectures (textbook in preparation),
2. Teaching material available on the Merlin e-learning system (https://moodle.srce.hr)

1.11. Recommended Reading

1. T. I. Fossen: "Marine Control Systems - Guidance, Navigation and Control of Ships, Rigs and Underwater Vehicles", Marine Cybernetics, Trondheim, Norway, 2002.
2. George M. Siouris: Missile Guidance and Control Systems, Springer New York, 2013
3. Konsberg manual - "Integrated ship control-Functional specification - Power management system, process control unit, signal acquisation unit"

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1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
V. Tomas, Ship automatic control, authorized lectures (textbook in preparation)	55	55
E-course syllabus available on the e-learning system - Merlin	-	55

1.13. Quality Assurance

The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of the exams is made annually and a student survey is conducted once a semester.

[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	**Irena Jurdana**		
Course	**Computer networks and protocols**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Type of Course	elective		
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

The objective of this course is to develop comprehensive knowledge in data transmission and computer networking, in accordance with the requirements of the STCW Convention. Emphasis is placed on understanding the architecture and protocols of local communication and computer networks, alongside the practical application, configuration, and maintenance of both software and hardware components for onboard local area networks (LANs) on ships.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Describe the model of a communication system and an information network
2. Compare data processing systems and explain the client-server model
3. List types and applications of codes, analyse error protection coding methods and line codes
4. Explain the layered architecture of an information network
5. Describe LAN, WLAN, and VLAN
6. Analyse technologies for Internet access
7. List and compare the OSI model, TCP/IP and Internet, Ethernet, and NMEA protocols
8. Interpret the automatic telephone system on a ship

1.4. Course Outline

Introduction to Computer Networks, Communication Models, Data Transmission,Classification of Computer Networks, Network Standards, OSI Architecture, Internet Architecture, Transmission Media, Local Area Networks, TCP/IP Model, NMEA Protocol, Data Protection, Network Monitoring and Management, Automatic Telephone System on a Ship, Design and Use of Computer Networks on a Ship

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

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[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.

1.6. Comments	

1.7. Student Obligations

Regular class attendance, first and second midterm exams, presentation of a practical exercise during exercise classes, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	1	Oral exam	0,5	Essay		Research	
Project		Continuous Assessment	1	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 process of evaluating acquired learning outcomes is carried out in accordance with the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- Through continuous knowledge assessment during the course, 70% of the learning outcomes are evaluated via:
  1st midterm exam – learning outcomes 1–4 (25%)
  2nd midterm exam – learning outcomes 5–8 (25%)
  Including the presentation of a practical task – learning outcomes 1–8 (10% in each midterm).
  In each midterm exam, the student must achieve a minimum of 50% of the points.
- The final exam evaluates the remaining 30% of the learning outcomes (1–8), and the student must achieve at least 50% of the points to pass the final exam.

Examples of evaluation of learning outcomes in relation to the stated learning objectives are:

1. Define, correctly interpret, and graphically represent the communication system model
2. Explain the advantages and disadvantages of analog and digital communications
3. Define an information network and list its applications in maritime settings
4. Explain and describe the working principle of data processing systems and the client-server model
5. Briefly describe types and applications of codes, analyse error protection coding methods and line codes
6. Explain the layered architecture of an information network
7. Compare and identify similarities between LAN, WLAN, and VLAN
8. Analyse technologies for accessing the Internet network
9. Explain the application and compare the OSI model, TCP/IP and Internet, Ethernet, and NMEA protocols
10. Explain the application and working principle of the automatic telephone system on a ship

1.10. Main Reading

1. Bažant A. i ost., Osnovne arhitekture mreža, Element, Zagreb, 2014.
2. Pandžić I.S. i ost., Uvod u teoriju informacije i kodiranje, Element, Zagreb, 2007.
3. Srbljić S.: Uvod u teoriju računarstva, Element, Zagreb, 2007.
4. Teaching material for lectures and exercises is available on the e-learning platform. - Merlin (https://moodle.srce.hr)

1.11. Recommended Reading

1. Andrew S. Tanenbaum, David J. Wetherall (2013.), Computer Networks, 5th ed., Pearson
2. James F. Kurose, Keith W. Ross (2020.), Computer Networking: A Top-Down Approach, 8. ed., Pearson
3. Larry L. Peterson, Bruce S. Davie (2011.), Computer Networks, Elsevier
4. Bažant A. i ost., Telekomunikacije-tehnologija i tržište, Element, Zagreb, 2007.
5. Lopac, Nikola ; Jurdana, Irena ; Wakabayashi, Nobukazu ; Liu, Hongze A Data Compression Approach to Reducing Demands on Maritime Communication Systems // Book of Extended Abstracts of the 16th Baška GNSS Conference: Technologies, Techniques and Applications Across PNT and The 3rd Workshop on Smart, Blue and Green Maritime Technologies. Rijeka: Pomorski fakultet Sveučilišta u Rijeci, 2023. str. 105-109
6. Liu, Hongze ; Jurdana, Irena ; Lopac, Nikola ; Wakabayashi, Nobukazu BlueNavi: A Microservices Architecture-Styled Platform Providing Maritime Information // Sustainability, 14 (2022), 4; 2173, 19. doi: 10.3390/su14042173
7. Jurdana, Irena; Lopac, Nikola; Wakabayashi, Nobukazu; Liu, Hongze: Shipboard Data Compression Method for Sustainable Real-Time Maritime Communication in Remote Voyage Monitoring of Autonomous Ships. // Sustainability, 13 (2021), 15; 8264, 22
8. Lopac, Nikola; Jurdana, Irena; Lerga, Jonatan; Wakabayashi, Nobukazu: Particle-Swarm-Optimization-Enhanced Radial-Basis-Function-Kernel-Based Adaptive Filtering Applied to Maritime Data. // Journal of marine science and engineering, 9 (2021), 4; 439, 35
9. Lopac, Nikola ; Lerga, Jonatan ; Jurdana, Irena On Evolutionary Metaheuristic Optimization Approaches in Data-Driven Signal Processing Techniques // My First Conference 2021 – Book of Abstracts. Rijeka: Pomorski fakultet Sveučilišta u Rijeci, 2021. str. 27-27
10. Jurdana, Irena; Krylov, Artem; Yamnenko, Julia: Use of Artificial Intelligence as a Problem Solution for Maritime Transport. // Journal of marine science and engineering, 8 (2020), 3; 201, 9
11. Teaching material for lectures and exercises is available on the e-learning platform. - Merlin (https://moodle.srce.hr)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Turk S.: Računarske mreže, Školska knjiga, Zagreb, 1991.	4	55
Bažant A. i ost., Osnovne arhitekture mreža, Element, Zagreb, 2004.	4	55
Pandžić I.S. i ost., Uvod u teoriju informacije i kodiranje, Element, Zagreb, 2007.	4	55
Srbljić S.: Uvod u teoriju računarstva, Element, Zagreb, 2007.	2	55
Teaching material for lectures and exercises is available on the e-learning platform. - Merlin (https://moodle.srce.hr)	-	55

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 results is conducted, and a student survey is carried out once per semester.

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3.2. Course description

Generic information		
Head of Course	Jasmin Ćelić, PhD	
Course	Databases	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
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 concepts of database theory with an emphasis on relational databases.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Define fundamentals of the database concepts
2. Describe the basic parts of a database management system
3. Create relational data models based on user requirements
4. Use relational algebra and SQL queries in solving practical problems
5. Recognize the normal form of a relational database
6. Solve problems using system and aggregate functions and grouping

1.4. Course Outline

Introduction to databases. Database concepts. Relational data model. Relational algebra. Operations in the relational model. Non-procedural languages for working with a relational database - SQL. Integrity rules in a relational data model. The notion of zero-value and incomplete information. Elements of addiction theory. Normalization, normal forms. Temporal databases. Transactions, triggers and stored procedures. Introduction to object-relational databases. Fundamentals of physical organization, indexes, B-tree, R-tree.

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

1st preliminary exam, 2nd preliminary exam, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation	0,5	Seminar paper		Experiment	
Written exam	1	Oral exam	0,5	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

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:

- 70% of acquired learning outcomes are evaluated through continuous testing of knowledge during classes:
  through the 1st preliminary exam - learning outcomes 1.-3. (35%), 2nd preliminary exam - learning outcomes 4.-6. (35%); while a student after each preliminary exam must realize a minimum of 50% of points;
- at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-6), whereby the student must realize a minimum of 50% of points to pass the final exam;
- final ECTS grade, is defined on the basis of the achieved total% of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:
  - grade excellent (5) corresponds to grade A in the ECTS scale and a success rate of 90 to 100%,
  - a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,
  - grade good (3) corresponds to grade C in the ECTS scale and a success rate of 60 to 74.9%,
  - a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,
  - the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.

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

1. What is a database? (LO # 1)
2. What are the most important tasks of a database management system? (LO # 2)
3. What is a recursive or involute relationship? (LO # 3)
4. Write an expression to create the relation "Destination" shown in the figure below. (LO # 4)

Naziv broda	Nosivost	Naziv kompanije	mbr	Odredišna luka
Kobayashi Maru	25200	Croatia line	3032012	Beira
Al-Batani	42800	Tankerska plovidba	2022012	Kalamata
Peterson	13500	Tankerska plovidba	2022012	Dalian
Gettysburg	28000	Lošinjplov	1012012	Tripoli
Chang Zhau	36450	Croatia line	3032012	Georgetown

5. When is the relation in 2NF? (LO # 5)
6. If the following code is applied to the "Exams" relation shown below, draw a relation that will display the result. (LO # 6)

```
SELECT nazPred
, akGod
, AVG(ocjena) AS prosjOcj
, MAX(ocjena) AS maxOcj
FROM ispiti
GROUP BY nazPred, akGod;
```

mbrStud	akGod	nazPred	ocjena
100	2012	Baze podataka	3
101	2012	Baze podataka	5
102	2012	Baze podataka	2
103	2009	Baze podataka	3
100	2014	Algoritmi	5
101	2009	Algoritmi	5
102	2009	Algoritmi	2
100	2012	Matematika	4

1.10. Main Reading

- Ćelić, J. (2021.). Databases, authorized lectures, Faculty of Maritime Studies, University of Rijeka, Rijeka, Croatia (online)
- Manger, R. (2014.). Baze podataka, Element, Zagreb, Croatia (in Croatian)
- Maleković, M., Schatten, M. (2017.). Teorija i primjena baza podataka, Faculty of Organization and Informatics, Varaždin, Croatia (in Croatian)

1.11. Recommended Reading

- Price, J. (2014.). Oracle Database 12c SQL, McGraw-Hill, USA

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
• Manger, R. (2014.). Baze podataka, Element, Zagreb, Croatia (in Croatian)	5	50

1.13. Quality Assurance

The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of the exams is made annually and a student survey is conducted once a semester.

[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	Boris Svilicic		
Course	Digital Electronics		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Obligatory		
Year of Study	**2nd**		
Estimated Student Workload and Methods of Instruction	**ECTS coefficient of Student Workload**		**6**
	Number of Hours (L+E+S)		**3+2**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Gaining knowledge on basic working principles of digital electronic circuits for data memorizing and processing.

1.2. Prerequisites for Course Registration

Completed course "Fundamentals of Electrotechnic".

1.3. Expected Learning Outcomes

1. Terms definition and application of the basic numerical systems and codes.
2. Working principles of basic logic circuits.
3. Axioms and theorems of Boole algebra.
4. Working principles of integrated logic circuits.
5. Working principles of the combination circuits.
6. Logic function minimization technics.
7. Working principles of the combination modules.
8. Working principles of the universal modules: decoder, multiplexor, permanent memory and programmable logic array.
9. Working principles of the sequential circuits: bistable, registers and counters.
10. Working principles of digital arithmetic circuits.
11. Working principles of circuits for generation of digital signals.
12. Working principles of static and dynamic memories.
13. Working principles of digital-analog and analog-digital convertors.

1.4. Course Outline

Numerical systems and codes. Logical circuits. Boole algebra. Integrated logical circuits. Combination circuits. Logic functions minimization. Combination modulus. Universal modules, decoder, multiplexor, permanent memory and programmable logic array. Sequential circuits: bistable, registers and counters. Digital arithmetic circuits. Circuits for generation of digital signals. Static and dynamic memories. Digital-analog and analog-digital convertors.

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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

Regular class attendance (all students are expected to abide by the class attendance policy set forth by the Faculty of Maritime Studies), and passed course work (achievement tests pass grade). A min of 35 credits.

1.8. Assessment[1] of Learning Outcomes

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

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

Assessment of learning outcomes:

- During the classes by collecting 70 credits through the first colloquium (learning outcomes 1.3.1 - 1.3.8, in total 28 credits), second colloquium (learning outcomes 1.3.8 - 1.3.13, in total 29 credits), laboratory work (learning outcomes 1.3.1 - 1.3.13, in total 13 credits);
- On the final exam by collecting additional 30 credits.

Examples of Evaluation:

1. Explain working principles of NAND circuit realized in CMOS technology.
2. Explain working principles of the decoder.
3. Explain working principles of the permanent memory.
4. Explain working principles of the bistable.
5. Explain working principles of the register.
6. Explain working principles of the circuit for digital multiplying.
7. Explain working principles of the circuit for generation of squared signal.
8. Explain working principles of the static and dynamic memories.
9. Explain working principles of the circuit for the analog-digital and digital-analog convertors.

1.1. Main Reading

Lecture materials.

1.2. Recommended Reading

- T.Floyd, Digital Fundamentals, Prentice-Hall, 1997.
- R. Tokheim, Digital electronics, McGraw-Hill, 1990.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Lecture materials	web	78
- T.Floyd, Digital Fundamentals, Prentice-Hall, 1997. - R. Tokheim, Digital electronics, McGraw-Hill, 1990.	1	78

1.4. Quality Assurance

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Internal: student feedback at the end of academic year and the course review by the head of course at the end of academic year.
External: Program quality review carried by the QA Agency.

[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	**Irena Jurdana**		
Course	**Electrical Measurement and Instrumentation**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Type of Course	mandatory		
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

Acquiring knowledge of electrical engineering measurements, measurement methods, and measuring instrumentation. Ability to independently measure fundamental electrical engineering values in accordance with the STCW Convention.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Describe the measurements of physical values and the measurement result
2. Compare electrical measuring instruments with digital instruments
3. Analyse the measurement of resistance, capacitance, and inductance
4. Explain the extension of voltage and current measurement ranges
5. Use digital measuring instruments
6. Describe the operating principle of an oscilloscope and perform basic measurements
7. Compare the measurement of non-electrical quantities
8. Analyse remote measurements and measurement systems

1.4. Course Outline

Measurement of physical values. Expression of measurement results. Electronic measurement instruments. Use of measuring instruments. Measurement systems. Measurement of electric current and voltage. Measurement of electric power and energy. Measurement of impedance. Measurement of frequency and period. Measuring sources. Measurement of electrical signal parameters in the time and frequency domains. Measurements on optical fibres. Remote measurements. Measurement of non-electrical quantities. Working with basic measurement instruments for measuring analog and digital electrical quantities.

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

Regular class attendance, first and second midterm exams, presentation of a practical measurement exercise during laboratory classes, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation	0,5	Seminar paper		Experiment	
Written exam	1	Oral exam	1	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

The process of evaluating acquired learning outcomes is carried out in accordance with the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka as follows:
Through continuous knowledge assessment during the course, 70% of the learning outcomes are evaluated via:
1st midterm exam – learning outcomes 1–4 (25%)
2nd midterm exam – learning outcomes 5–8 (25%)
Including the presentation of a practical measurement task – learning outcomes 1–8 (10% in each midterm).
In each midterm exam, the student must achieve a minimum of 50% of the points.
The final exam evaluates the remaining 30% of the learning outcomes (1–8), and the student must achieve at least 50% of the points to pass the final exam.
Examples of evaluation of learning outcomes in relation to the stated learning objectives are:

1. Describe basic measured values, list the International System of Units, distinguish between measurements of physical values, and demonstrate examples of expressing measurement results.
2. Describe and explain comparison parameters between electrical measuring instruments and digital instruments.
3. Identify and interpret different methods for measuring resistance, capacitance, and inductance.
4. Interpret the extension of voltage and current measurement ranges.
5. Apply digital measuring instruments for basic measurements and express measurement results in graphical and numerical form.
6. Use basic oscilloscope measurement functions and perform basic practical measurements.
7. Explain the application of measurements on optical fibres and comment on the advantages and disadvantages of such applications.
8. Describe and explain frequency measurements and measure basic signal characteristics. Calculate and graphically present the measured parameters.
9. Concisely describe measurement methods, components of a measurement system, and the application of non-electrical quantity measurements in maritime settings.
10. Compare the use of remote measurements and measurement systems.

1.10. Main Reading

1. V. Bego, Mjerenja u elektrotehnici, Graphis, Zagreb, 2003.
2. D. Vujević, B. Ferković, Osnove elektrotehničkih mjerenja, I. i II. dio, Školska knjiga, Zagreb, 2001.
3. F. Mlakar, Električna mjerenja, Tehnička knjiga, Zagreb, 2003.
4. G.P. Agrawal: Fiber-Optic Communication Systems, John Wiley, 2010.
5. J.P.Dakin, Handbook of Optoelectronics, Taylor&Francis Group, 2006.
6. Teaching materials for laboratory exercises are available on the e-learning platform. - Merlin (https://moodle.srce.hr)

1.11. Recommended Reading

1. W. Nawrocki: Measurement Systems and Sensors, Artech House, 2005.
2. Robert B. Northrop: Introduction to Instrumentation and Measurements, 2nd edition, CRC Press, 2005.
3. Beşikçi, Elif Bal, Solmaz, Murat Selçuk, Jurdana, Irena: Determining the awareness and knowledge of officers towards ship energy efficiency measures. // Pomorstvo : scientific journal of maritime research, 35 (2021), 2; 327-340
4. Ivče, Renato; Mohović, Robert; Jurdana, Irena: Methods of analysis and measurement procedures for determining the liquid level in the ships tanks and bilges. // Pomorstvo : scientific journal of maritime research, 23 (2009), 2; 635-648
5. Lopac, Nikola ; Jurdana, Irena ; Brnelić, Adrian ; Krljan, Tomislav: Application of Laser Systems for Detection and Ranging in the Modern Road Transportation and Maritime Sector // Sensors, 22 (2022), 16; 5946, 27. doi: 10.3390/s22165946
6. Lopac, Nikola ; Lerga, Jonatan ; Jurdana, Irena On Evolutionary Metaheuristic Optimization Approaches in Data-Driven Signal Processing Techniques // My First Conference 2021 – Book of Abstracts. Rijeka: Pomorski fakultet Sveučilišta u Rijeci, 2021. str. 27-27

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1.12. Number of Main Reading Examples

Title	*Number of*	*Number of*
V. Bego, Mjerenja u elektrotehnici, Graphis, Zagreb, 2003.	6	70
D. Vujević, B. Ferković, Osnove elektrotehničkih mjerenja, I. i II. dio, Školska knjiga, Zagreb, 2001.	4	70
Teaching materials for laboratory exercises are available on the e-learning platform - Merlin (https://moodle.srce.hr)	-	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 results is conducted, and a student survey is carried out once per semester.

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3.2. Course description

Generic information			
Head of Course	Boris Svilicic		
Course	Electronic Devices and Circuits		
Study Programme	Marine Electronic Engineering and Information Technology		
Level	Undergraduate		
Type of Course	Obligatory		
Year of Study	**2nd**		
Estimated Student Workload and Methods of Instruction	**ECTS coefficient of Student Workload**	**6**	
	Number of Hours (L+E+S)	**4+2**	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Gaining knowledge on basic working principles of solid-state electronic devices and analog electronic circuits.

1.2. Prerequisites for Course Registration

Completed course "Fundamentals of Electrotechnic".

1.3. Expected Learning Outcomes

1. Fundamentals of the physical theory of semiconductor materials.
2. Working principles of diodes.
3. Working principles of bipolar transistors.
4. Working principles of unipolar transistors.
5. Working principles of amplifiers based on bipolar transistors.
6. Working principles of amplifiers based on unipolar transistors.
7. Working principles of amplifier cascades.
8. Working principles of differential amplifier.
9. Working principles of circuits with the feedback.
10. Analysis of dynamic characteristics of electronic circuits.
11. Working principles of power amplifiers.
12. Working principles of the operational amplifier.
13. Working principles of amplifiers based on the operational amplifier.

1.4. Course Outline

Fundamentals of the physical theory of semiconductor materials. Diodes. Bipolar transistors. Unipolar transistors. Amplifiers based on bipolar transistors. Amplifiers based on unipolar transistors. Amplifier cascades. Differential amplifier. Circuits with the feedback. Power amplifiers. Operational amplifier. Amplifiers based on the operational amplifier.

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

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	☐ Field work	☐ Other _____

1.6. Comments

1.7. Student Obligations

Regular class attendance (all students are expected to abide by the class attendance policy set forth by the Faculty of Maritime Studies), and passed course work (achievement tests pass grade). A min of 35 credits.

1.8. Assessment[1] of Learning Outcomes

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

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

Assessment of learning outcomes:

- During the classes by collecting 70 credits through the first colloquium (learning outcomes 1.3.1 - 1.3.8, in total 27 credits), second colloquium (learning outcomes 1.3.8 - 1.3.13, in total 27 credits), laboratory work (learning outcomes 1.3.1 - 1.3.13, in total 16 credits);
- On the final exam by collecting additional 30 credits.

Examples of Evaluation:

1. Explain working principles of the diode.
2. Explain working principles of the bipolar transistor.
3. Explain working principles of the unipolar transistor.
4. Explain working principles of the amplifiers based on bipolar transistors.
5. Explain working principles of the circuit with the negative feedback.
6. Explain working principles of the differential amplifier.
7. Explain working principles of the power amplifier class B.
8. Explain working principles of the operational amplifier.
9. Explain working principles of the integrating amplifier.

1.1. Main Reading

Lecture materials.

1.2. Recommended Reading

Horowits and Hill, The Art of Electronics, Cambridge University Press, 2001

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Lecture materials	web	78
Horowits and Hill, The Art of Electronics, Cambridge University Press, 2001	1	78

1.4. Quality Assurance

Internal: student feedback at the end of academic year and the course review by the head of course at the end of academic year.
External: Program quality review carried by the QA Agency.

[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	**Irena Jurdana**		
Course	**Electronic Navigation Devices**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Type of Course	mandatory		
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 objectives of the course are to provide comprehensive knowledge of electronic navigation equipment in accordance with the STCW Convention. The course covers both the theoretical principles and practical application of navigation systems used on ships.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

Describe the types and applications of electronic navigation devices
Explain hyperbolic navigation systems
Compare and describe the operation and types of gyrocompasses

1. Explain the types and applications of GPS and DGPS systems, as well as their operating principles
2. Describe radar, list its basic features, and compare it with ARPA radar systems
3. Analyse ultrasonic navigation systems
4. Explain the AIS communication-navigation system and its applications
5. Analyse and describe the VDR (Voyage Data Recorder)

1.4. Course Outline

Overview of electronic navigation devices, Radio direction finder, Hyperbolic navigation systems, Loran-C system and transmission of its stations, GNSS (GPS, GLONASS), Differential GPS and its variants, Radar antennas, ARPA radar, Ultrasonic navigation systems, Echo sounder, Gyrocompass, Fiber optic gyroscope, AIS communication-navigation system and VTS, VDR, Speed log.

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] **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.

1.6. Comments	

1.7. Student Obligations

Regular class attendance, first and second midterm exams, presentation of a practical exercise during exercise classes, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam	0,5	Oral exam	1	Essay		Research	
Project		Continuous Assessment	1	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 process of evaluating acquired learning outcomes is carried out in accordance with the Regulations on Studies of the University of Rijeka and the Regulations on Studying at the Faculty of Maritime Studies in Rijeka as follows:

- Through continuous knowledge assessment during the course, 70% of the learning outcomes are evaluated via:
  1st midterm exam – learning outcomes 1–4 (25%)
  2nd midterm exam – learning outcomes 5–8 (25%)
  Including the presentation of a practical task – learning outcomes 1–8 (10% in each midterm).
  In each midterm exam, the student must achieve a minimum of 50% of the points.
- The final exam evaluates the remaining 30% of the learning outcomes (1–8), and the student must achieve at least 50% of the points to pass the final exam.

Examples of evaluation of learning outcomes in relation to the stated learning objectives are:

1. Define and explain the parameters used to compare analog and digital communications
2. Describe the types and applications of electronic navigation devices
3. Interpret hyperbolic navigation systems
4. List the main types of gyrocompasses and describe their operating principles
5. Explain the types and applications of GPS systems, as well as their operating principles
6. Compare differential GPS and its variants with the conventional GPS system
7. Describe radar, its basic features, and pulse radar
8. Compare the usage and basic functions of ultrasonic navigation systems
9. Explain the AIS communication-navigation system and its application
10. Explain the use of the VDR system

1.10. Main Reading

1. Jurdana I., Sušanj J.; Sustavi elektroničke navigacije, Pomorski fakultet Rijeka, 2013.
2. Sušanj J., Navigacijski radar, Pomorski fakultet Rijeka, 2006.
3. Teaching material for lectures and exercises is available on the e-learning platform. - Merlin (https://moodle.srce.hr)

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1.11. Recommended Reading

1. Čavara J., Uvod u radarsku tehniku, 2008.
2. Tetley L., Calcutt D., Electronic Navigation Systems, Oxford, 2003.
3. Wakabayashi, Nobukazu; Jurdana, Irena**:** Maritime Communications and Remote Voyage Monitoring. // 2020 International Conference on Broadband Communications for Next Generation Networks and Multimedia Applications (CoBCom),Graz, Austrija: IEEE, 2020. str. 116-123
4. Wakabayashi, Nobukazu; Jurdana, Irena; Yashiro, Tatsuya: The Development of a Route Generation Procedure Incorporating Collision Avoidance Applicable to Automatic Maneuvering — The Effective Utilization of Collision Avoidance Polygons. // Proceedings of the Thirtieth (2020) International Ocean and Polar Engineering Conference Shanghai Shanghai: ISOPE-International Society of Offshore and Polar Engineers, 2020. str. 3551-3557
5. Jurdana, Irena; Lopac, Nikola; Wakabayashi, Nobukazu; Liu, Hongze: Shipboard Data Compression Method for Sustainable Real-Time Maritime Communication in Remote Voyage Monitoring of Autonomous Ships. // Sustainability, 13 (2021), 15; 8264, 22
6. Lopac, Nikola ; Jurdana, Irena ; Wakabayashi, Nobukazu ; Liu, Hongze A Data Compression Approach to Reducing Demands on Maritime Communication Systems // Book of Extended Abstracts of the 16th Baška GNSS Conference: Technologies, Techniques and Applications Across PNT and The 3rd Workshop on Smart, Blue and Green Maritime Technologies. Rijeka: Pomorski fakultet Sveučilišta u Rijeci, 2023. str. 105-109
7. Škrobonja, Antonio; Jurdana , Irena; Panić, Ivan: Wakabayashi, Nobukazu ,Marine Fiber Optic and Spinning Mass Gyrocompasses. // MIPRO 2020 - 43rd International Convention / Skala, Karolj (ur.). Rijeka: Croatian Society for Information, Communication and Electronic Technology – MIPRO, 2020. str. 2237-2241
8. Lopac, Nikola ; Jurdana, Irena ; Wakabayashi, Nobukazu ; Liu, Hongze Application of Advanced Digital Technologies for AIS Data Utilization // Book of Extended Abstracts of the 15th Baška GNSS Conference: Technologies, Techniques and Applications Across PNT and The 2nd Workshop on Smart, Blue and Green Maritime Technologies. Rijeka: Pomorski fakultet Sveučilišta u Rijeci, 2022. str. 145-148
9. Lopac, Nikola ; Jurdana, Irena ; Brnelić, Adrian ; Krljan, Tomislav Application of Laser Systems for Detection and Ranging in the Modern Road Transportation and Maritime Sector // Sensors, 22 (2022), 16; 5946, 27. doi: 10.3390/s22165946
10. Teaching material for lectures and exercises is available on the e-learning platform. - Merlin (https://moodle.srce.hr)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Sušanj J., Navigacijski radar, Pomorski fakultet Rijeka, 2006.	6	55
Jurdana I., Sušanj J.; Sustavi elektroničke navigacije, Pomorski fakultet Rijeka, 2013.	6	55
Teaching material for lectures and exercises is available on the e-learning platform. - Merlin (https://moodle.srce.hr)	-	55

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 results is conducted, and a student survey is carried out once per semester.

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3.2. Course description

Generic information		
Head of Course	**Irena Bogunović**	
Course	**English 1**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	**Undergraduate**	
Type of Course	**Compulsory**	
Year of Study	1.	
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 main objectives of the course are to expand students' proficiency in General English through building general vocabulary, extending their command of English grammar and developing students' speaking, listening, reading and writing skills as basic prerequisites for future use of English in professional environment.		
1.2. Prerequisites for Course Registration		
/		
1.3. Expected Learning Outcomes		
It is expected that the students will be able: 1. To summarize the main points of a written text 2. To analyse a short, written text 3. To interpret unknown words from the context 4. To recognize and identify different grammatical categories and their function in a sentence 5. To apply grammatical rules of the English language in practice		
1.4. Course Outline		
The course focuses on broadening general vocabulary as well as some key aspects of grammar, including: tenses (simple present, present continuous, simple past, past continuous, present perfect, past perfect, future) and aspect, passive, if clauses, parts of speech, clauses and sentences (affirmative/negative & interrogative forms).		
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, a minimum of 35 credits (50%) attained from continuous assessment components during the semester, and passing the final exam are required.

1.8. Assessment of Learning Outcomes

Course attendance	1.50	Class participation		Seminar paper		Experiment	
Written exam	0.50	Oral exam		Essay		Research	
Project		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 assessment of achieved learning outcomes is conducted as follows:

a. Continuous assessment accounts for 70% of the total evaluation of learning outcomes, with a minimum of 50% required to pass.

- Continuous assessment includes:
  - 1st midterm test (learning outcomes 1–5)
  - 2nd midterm test (learning outcomes 1–5)
  - 3rd midterm test (learning outcomes 1–5)

b. The final written exam accounts for 30% of the total evaluation and assesses learning outcomes 1–5. A minimum of 50% is required to pass.

Examples of the evaluation of individual learning outcomes include the following:

1. Analyse a given text and identify the time frame in context (learning outcomes 1, 2, 3).
2. Interpret the context of a sentence and use the appropriate voice (learning outcomes 3, 4, 5).
3. Use the appropriate verb tense in relation to the context.
4. Determine whether a sentence is in the active or passive voice and apply the correct verb form accordingly (learning outcomes 1-5).
5. Select the appropriate conditional based on the context (learning outcomes 1-5).

1.1. Main Reading

1. Jelčić Čolakovac, J. i Bogunović, I. (2021). *Grammar for mariners: grammar coursebook for students of maritime courses*. Rijeka: University of Rijeka, Faculty of Maritime Studies.
2. Bogunović, I. Lectures, available on Merlin

1.2. Recommended Reading

1. Swan, M. (2005). *Practical English Usage* (3rd edition). Oxford: Oxford University Press.
2. Murphy, R. (2004). *English Grammar in Use* (3rd edition). Cambridge: Cambridge University Press.
3. Vince, M. & Sunderland, P. (2003). *Advanced Language Practice With Key*. Oxford: MacMillan.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Grammar for mariners: grammar coursebook for students of maritime courses	10	65

1.4. Quality Assurance

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Internal:

- Student feedback (SET - Student Evaluation of teaching) at the end of the semester.

External:

- Programme quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Irena Bogunović**	
Course	**English 2**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	**Undergraduate**	
Type of Course	**Compulsory**	
Year of Study	1.	
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 main objectives of this course are acquiring basic knowledge and skills necessary for the use of English language in the electronics and maritime fields, as well as extending general English knowledge.		
1.2. Prerequisites for Course Registration		
Attended course English 1		
1.3. Expected Learning Outcomes		
It is expected that the students will be able: 1. Translate basic electronics- and maritime-related terminology from Croatian into English and from English into Croatian. 2. Independently use basic mathematical expressions in English 3. Define and describe basic concepts from the electronics field in English 4. Define and describe basic concepts related to types & parts of ships using professional terminology in English 5. Design a power point presentation & deliver oral presentation on the selected profession-related topic in English		
1.4. Course Outline		
The course focuses on professional language & terminology related to: atomic structure, electricity, magnetism and magnetic properties, electromagnetism, basic electronic components, types of vessels and ship design. The course includes selected texts and other materials to demonstrate text/genre/discourse features associated with the language of profession, at same time improving general language (e.g., plural forms, mathematical expressions.		
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, a minimum of 35 credits (50%) attained from continuous assessment components during the semester, and passing the final exam are required.

1.8. Assessment of Learning Outcomes

Course attendance	1.50	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	0.50	Essay		Research	
Project		Continuous Assessment	0.70	Oral presentation	0.30	Practical work	
Portfolio							

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

Through active class participation and continuous assessment, the student achieves up to 70%, while with the oral final exam up to 30% of the final grade.

The assessment of achieved learning outcomes is conducted through the following grading components:

a. active class participation (learning outcomes 1-4)
b. two midterm tests (learning outcomes 1-4)
c. oral presentation (learning outcome 5)
d. final exam (learning outcomes 1-4)

Examples of Assessment of Learnin g Outcomes:
1. Translate given Croatian terms into English (e.g., *poluvodič* – semiconductor; *napon* - voltage).
2. Mathematical expression 6^3 is read as "six _____".
3. Describe the working principle of a transistor using professional terminology in English.
4. Provide English terms for the selected parts of a ship shown in the picture (e.g., bow, stern, superstructure).
5. Deliver oral presentation on the selected topic.

1.1. Main Reading

1. Štambuk, A. (2002). English in electrical engineering and computing. Split:FESB
2. Ibbotson, M. (2009). Professional English in use: Engineering. Cambridge: Cambridge University Press.
3. Pritchard, B. (1995). Maritime English 1. Zagreb: Školska knjiga
4. I. Bogunović. Lectures, available on Merlin

1.2. Recommended Reading

1. Bartolić, LJ. (1994). Technical English in electronics and electrical power engineering. Zagreb: Školska knjiga
2 Glendinning, E. H. & McEwan, J. (2002). Oxford English for electronics. Oxford: Oxford University Press
3. Swan, Michael. 2005. Practical English Usage. Third edition. Oxford: Oxford University Press. (Intermediate to Advanced).
4. Murphy, Raymond. 2004. English Grammar in Use. 3rd edition. Cambridge: Cambridge University Press. (Intermediate to Upper Intermediate).
5. Nettle, Mark & Diana Hopkins. 2003. Developing Grammar in Context. Grammar reference and practice. Cambridge University Press. (Intermediate).
6. Vince, Michael & Peter Sunderland. 2003. Advanced Language Practice With Key. Oxford: MacMillan.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Štambuk, A. (2002). English in electrical engineering and computing. Split:FESB	5	65
Ibbotson, M. (2009). Professional English in use: Engineering. Cambridge: Cambridge University Press.	Available on Merlin	65

Pritchard, B. (1995). Maritime English 1. Zagreb: Školska knjiga	5	65

1.4. Quality Assurance

Internal:

- Student feedback (SET - Student evaluation of teaching) at the end of the semester.

External:

- Programme quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Irena Bogunović**	
Course	**English 3**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	**Undergraduate**	
Type of Course	**Compulsory**	
Year of Study	2.	
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 course is focused on developing students' communication skills, acquisition of specific vocabulary related to the fields of information technology and telecommunications, and improving general English knowledge.

1.2. Prerequisites for Course Registration

Attended courses English 1 & 2

1.3. Expected Learning Outcomes

It is expected that the students wi ll be able:
1. To discuss the selected profession-related topics in English
2. To independently use professional terminology related to information technology and telecommunications.
3. To define & explain basic IT-related concepts in English
4. To define & explain basic concepts related to telecommunications in English
5. To design a power point presentation & deliver oral presentation on the selected profession-related topic

1.4. Course Outline

The course focuses on professional language & terminology related to information technology (computer hardware, computer software, application of computers on ships) and telecommunications (telecommunication systems, analogue and digital communications, radio waves and radio communication, optical fibres). The course includes selected texts and other materials to demonstrate text/genre/discourse features associated with the language of profession, at same time improving general language skills.

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, a minimum of 35 credits (50%) attained from continuous assessment components during the semester, and passing the final exam are required.

1.8. Assessment of Learning Outcomes

Course attendance	1.50	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	0.50	Essay		Research	
Project		Continuous Assessment	0.70	Oral presentation	0.30	Practical work	
Portfolio							

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

Through active class participation and continuous assessment, the student achieves up to 70%, while with the oral final exam up to 30% of the final grade.

The assessment of achieved learning outcomes is conducted through the following grading components:

a. active class participation (learning outcomes 1-4)
b. two midterm tests (learning outcomes 1-4)
c. oral presentation (learning outcome 5)
d. final exam (learning outcomes 1-4)

Examples of Assessment of Learning Outcomes :
1. Actively participate in a debate on the role of the Internet in everyday life in English.
2. Name and describe the parts of an optical fibre.
3. Explain ECDIS.
4. Describe the process of analogue-to-digital conversion in English.
5. Deliver oral presentation on the selected topic in English.

1.1. Main Reading

1. Štambuk, A. (2002). *English in electrical engineering and computing*. Split:FESB
2. Glendinning, E. H. & McEwan, J. (2006). *Oxford English for Information Technology* (2nd edition). Oxford: Oxford University Press.
3. I. Bogunović. Lectures, available on Merlin

1.2. Recommended Reading

1. Bartolić, LJ. (1994). *Technical English in electronics and electrical power engineering*. Zagreb: Školska knjiga
2. Swan, M. (2005). *Practical English Usage* (3rd edition). Oxford: Oxford University Press.
4. Vince, M.& Sunderland, P. (2003). *Advanced Language Practice With Key*. Oxford: MacMillan.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Štambuk, A. (2002). *English in electrical engineering and computing*. Split:FESB	5	65
Glendinning, Eric H. & John McEwan. (2006). *Oxford English for Information Technology* (2nd edition). Oxford: Oxford University Press.	5	65

1.4. Quality Assurance

Internal:
- Student feedback (SET - Student evaluation of teaching) at the end of the semester.

External:
- Programme quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Irena Bogunović**	
Course	**English 4**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	**Undergraduate**	
Type of Course	**Compulsory**	
Year of Study	2.	
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 course is focused on providing students the knowledge and skills necessary for oral and written communication in English in professional environment by broadening specific and general vocabulary knowledge to the field of power generation, transmission & distribution, and expanding general English knowledge.

1.2. Prerequisites for Course Registration

Attended courses English 1, 2 & 3

1.3. Expected Learning Outcomes

It is expected that the students will be able:
1. To discuss the topics related to power generation, transmission & distribution in English
2. To translate professional terminology from Croatian into English and from English into Croatian
3. To provide the correct English terms for profession-related concepts
4. To independently use professional terminology in English
5. To design a power point presentation & deliver oral presentation on the selected profession-related topic

1.4. Course Outline

The course focuses on professional language & terminology related to ship power generation, transmission & distribution (transformers, circuit breakers & fuses, generators, diesel engines, electric motors), and ancillary electrical services (marine refrigeration and air conditioning systems, navigation lights, etc.). The course includes selected texts and other materials to demonstrate text/genre/discourse features associated with the language of profession, at same time improving general English language skills.

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, a minimum of 35 credits (50%) attained from continuous assessment components during

the semester, and passing the final exam are required.

1.8. Assessment of Learning Outcomes

Course attendance	1.50	Class participation		Seminar paper		Experiment	
Written exam	0.50	Oral exam		Essay		Research	
Project		Continuous Assessment	0.70	Oral presentation	0.30	Practical work	
Portfolio							

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

Through active class participation and continuous assessment, the student achieves up to 70%, while with the oral final exam up to 30% of the final grade.

The assessment of achieved learning outcomes is conducted through the following grading components:

a. active class participation (learning outcomes 1-4)
b. two midterm tests (learning outcomes 1-4)
c. oral presentation (learning outcome 5)
d. final exam (learning outcomes 1-4)

Examples of Assessment of Learning Outcomes :
1.Discuss advantages and possible disadvantages of a shaft generator in English.
2.Translate the Croatian terms into English (e.g., *mjerni transformator*, *koljenasto vratilo*, *krmeno svjetlo*).
3. Name the selected parts of a diesel engine shown in the picture.
4. Fill in. A white navigation light that shines forward and to both sides, and is required for all engine-powered vessels, is called _____ light.
5. Deliver oral presentation on the profession-related topic in English.

Main Reading

1. Štambuk, A. (2002). *English in electrical engineering and computing*. Split:FESB
3. Bartolić, LJ. (1994). *Technical English in electronics and electrical power engineering*. Zagreb: Školska knjiga
4. Ibbotson, M. (2009). *Professional English in use: Engineering*. Cambridge: Cambridge University Press.
5. I. Bogunović. Lectures, available on Merlin

Recommended Reading

1. Hall, D. T. (2014). *Practical Marine Electrical knowledge* (3rd edition). Glasgow: Witherby Publishing Group Ltd.
2. Bartolić, LJ. (1994). *Technical English in electronics and electrical power engineering*. Zagreb: Školska knjiga
3. Swan, Michael. 2005. Practical English Usage. Third edition. Oxford: Oxford University Press.

Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Štambuk, A. (2002). English in electrical engineering and computing. Split:FESB	5	85
Bartolić, LJ. (1994). Technical English in electronics and electrical power engineering. Zagreb: Školska knjiga	5	
Ibbotson, M. (2009). Professional English in use: Engineering. Cambridge: Cambridge University Press.	Available on web	85

Quality Assurance

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

Through active class participation and continuous assessment, the student achieves up to 70%, while with the oral final exam up to 30% of the final grade.

The assessment of achieved learning outcomes is conducted through the following grading components:

a. active class participation (learning outcomes 1-4)
b. two midterm tests (learning outcomes 1-4)
c. oral presentation (learning outcome 5)
d. final exam (learning outcomes 1-4)

Examples of Assessment of Learning Outcomes :
1.Discuss advantages and possible disadvantages of a shaft generator in English.
2.Translate the Croatian terms into English (e.g., *mjerni transformator*, *koljenasto vratilo*, *krmeno svjetlo*).
3. Name the selected parts of a diesel engine shown in the picture.
4. Fill in. A white navigation light that shines forward and to both sides, and is required for all engine-powered vessels, is called _____ light.
5. Deliver oral presentation on the profession-related topic in English.

Main Reading

1. Štambuk, A. (2002). *English in electrical engineering and computing*. Split:FESB
3. Bartolić, LJ. (1994). *Technical English in electronics and electrical power engineering*. Zagreb: Školska knjiga
4. Ibbotson, M. (2009). *Professional English in use: Engineering*. Cambridge: Cambridge University Press.
5. I. Bogunović. Lectures, available on Merlin

Recommended Reading

1. Hall, D. T. (2014). *Practical Marine Electrical knowledge* (3rd edition). Glasgow: Witherby Publishing Group Ltd.
2. Bartolić, LJ. (1994). *Technical English in electronics and electrical power engineering*. Zagreb: Školska knjiga
3. Swan, Michael. 2005. Practical English Usage. Third edition. Oxford: Oxford University Press.

Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Štambuk, A. (2002). English in electrical engineering and computing. Split:FESB	5	85
Bartolić, LJ. (1994). Technical English in electronics and electrical power engineering. Zagreb: Školska knjiga	5	
Ibbotson, M. (2009). Professional English in use: Engineering. Cambridge: Cambridge University Press.	Available on web	85

Quality Assurance

Internal:
- Student feedback (SET - Student evaluation of teaching) at the end of the semester.

External:
- Programme quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Irena Bogunović**	
Course	**English 5**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	**Undergraduate**	
Type of Course	**Elective**	
Year of Study	3.	
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 course is focused on developing students' English communication skills, acquisition of specific knowledge related to the role of English in multicultural work environment (i.e., ship), cultural differences, cross-cultural communication, differences between English formal and informal communication as well as improving professional and general English knowledge through the four language skills.		
1.2. Prerequisites for Course Registration		
/		
1.3. Expected Learning Outcomes		
It is expected that the students will be able: 1. To discuss the selected profession-related topics in English 2. To use professional English language and terminology related to cross-cultural communication 3. To explain and examplify the role of intercultural differences in cross-cultural communication in English 4. To understand the differences between English as a foreign language, English as a second language and English as a global language 5. To write a short essay on a given topic in English formal or informal style 6. To identify linguistic differences between formal and informal style 7. To explore a selected profession-related problem/topic and present it in English		
1.4. Course Outline		
The course focuses on professional English language and terminology related to culture, cross-cultural communication, and the role of English in multinational and multicultural work environment. Different communication styles and problems related to intercultural communication are covered, as well as concepts such as bilingualism and multilingualism, English as a foreign vs. second language, and English as a global language. The course includes selected texts and other materials to demonstrate text/genre/discourse features associated with the language of profession, with special emphasis on multinational ship crew.		
1.5. Modes of Instruction	☒ Lectures ☐ Seminars and workshops ☐ Exercises ☐ E-learning ☐ Field work	☒ Practical work ☒ Multimedia and Network ☐ Laboratory ☐ Mentorship ☐ Other _____

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1.6. Comments	**/**

1.7. Student Obligations

Regular attendance, a minimum of 50 credits (50%) attained from continuous assessment components during the semester.

1.8. Assessment of Learning Outcomes

Course attendance	1.50	Class participation	0.60	Seminar paper		Experiment	
Written exam		Oral exam		Essay	0.30	Research	
Project		Continuous Assessment				Practical work	
Portfolio		Oral presentation	0.60				

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

Through active participation in various class activities (learning outcomes 1, 2, 3, 4, 6), essay (learning outcome 5) and oral presentation (learning outcome 7), the student achieves up to 100% of the total score.

Examples of Assessment of Learning Outcomes :
1. Actively participate in a debate on stereotypes aboard ship in English.
2. List three types of privileges.
3. Describe the potential communication difficulties on an example of a multinational ship crew, and discuss possible solutions.
4. Describe the difference between English as a foreign language and English as a second language.
5. Compose a short essay on a given topic in English.
6. Compare the given texts and describe the differences between them with respect to formal/informal style.
7. Deliver oral presentation in English on the selected profession-related topic/problem.

1.1. Main Reading

1. Hofstede, G., Hofstede, G. J., and Minkov, M. (2010). *Cultures and Organizations: Software of the Mind* (3rd edition). McGraw-Hill.
2. I. Bogunović, Lectures (available on Merlin).

1.2. Recommended Reading

1. Bogunović, I. and Jelčić Čolakovac, J. (2019). Uloga neformalnih aktivnosti u nenamjernom usvajanju jezika: povezanost uporabe jezika i jezičnog znanja. *Fluminensia 31(2),* 181–199.
2. Crystal, D. (2003). *English as a global language* (2nd edition). Cambridge: Cambridge University Press
3. Ćoso, B. and Bogunović, I. (2017). Person perception and language: A case of English words in Croatian. *Language & Communication, 53*, 25–34.
4. Graddol, D. (2006). *English next: Why Global English may mean the end of „English as a foreign language".* London: British Council.
5. Jelaska, Z. (2005). Materinski, drugi, strani i ostali jezici. In: Z. Jelaska, V. Blagus, M. Bošnjak, L. Cvikić, G. Hrţica, I. Kusin, J. Novak-Milić and N. Opaĉić, *Hrvatski kao drugi i strani jezik*, pp. 24-37. Zagreb: Hrvatska sveuĉilišna naklada.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Hofstede, G., Hofstede, G. J., and Minkov, M. (2010). *Cultures and Organizations: Software of the Mind* (3rd edition). McGraw-Hill	available online	30

1.4. Quality Assurance

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Internal:

- Student feedback (SET - Student evaluation of teaching) at the end of the semester

External:

- Programme quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Irena Bogunović**	
Course	**English 6**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	**Undergraduate**	
Type of Course	**Elective**	
Year of Study	3.	
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 course is primarily focused on developing students' business English skills, including oral (e.g., job interview) and written (e.g., e-mail) communication in English, and broadening their business-related English vocabulary.		
1.2. Prerequisites for Course Registration		
/		
1.3. Expected Learning Outcomes		
It is expected that the students will be able: 1. To discuss the selected profession-related topics in English 2. To explain the concepts related to language and other skills, and differentiate between CEFR proficiency levels 3. To explain the terms "English as a foreign language", "English as a second language" and "English as a global language" 4. To write a CV in English 5. To write a job application letter in English 6. To independently present their previous work experience, education, etc. in English 7. To explore and present a selected topic in English		
1.4. Course Outline		
The course focuses on business English and its role in various business-related means of communication (e.g., reading and interpreting various job ads, job interview, e-mail correspondence, job application letter, CV). The course builds on the previously learnt professional and general vocabulary, and further develops the use of English in a work environment by broadening the knowledge of formal language across the four language skills. At the end of the course, each student will have a ready-to-use CV in English.		
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 attendance, a minimum of 50 credits (50%) attained from continuous assessment components during the semester.

1.8. Assessment of Learning Outcomes

Course attendance	1.50	Class participation	0.60	Seminar paper		Experiment	
Written exam		Oral exam		Essay	0.30	Research	
Project		Continuous Assessment				Practical work	
Portfolio		Oral presentation	0.60				

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

To successfully complete the course, students are required to actively participate in various class activities (tasks, quiz, debate, etc.), attend at least 70% of classes, and obtain a minimum of 50% of the credits through in-semester assessment components.

The assessment of achieved learning outcomes is conducted as follows:
Learning outcomes are assessed through active class participation, written tasks (an application letter and a CV), and an oral presentation, which together account for 100% of the final score. A minimum of 50% must be achieved to pass.

Assessment Components and Related Learning Outcomes:

1. Class Participation, e.g., tasks, quizzes, debates (learning outcomes 1–7)
2. Curriculum Vitae in English (learning outcomes 2–4)
3. Job Application Letter in English (learning outcomes 2, 3, 5)

Examples of Learning Outcomes :

1. Orally present your previous work experience, education, professional interests, etc., in English.
2. Fill in the CV section related to language and communication skills.
3. Explain whether you use English as a foreign, second or global language.
4. Write a CV in English.
5. Write an application letter in English.
6. Demonstrate a job interview in English.
7. Find a job ad you are interested in and present it orally.

1.1. Main Reading

1. I. Bogunović, Lectures (available on Merlin).

1.2. Recommended Reading

1. Crystal, D. (2003). *English as a global language* (2nd edition). Cambridge University Press
2. Graddol, D. (2006). *English next: Why Global English may mean the end of „English as a foreign language*. British Council.
3. Council of Europe (2018). *Common European Framework Of Reference For Languages: Learning, Teaching, Assessment*. Council of Europe.
4. Emmerson, P. (2011). *Business English Handbook*. Macmillan.
5. Sweeney, S. (2003). *English for Business Communication*. Cambridge University Press.

1.3. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

I. Bogunović, Lectures	available online	30

1.4. Quality Assurance

Internal:

- Student feedback (SET - Student evaluation of teaching) at the end of the semester

External:

- Programme quality review carried by the QA Agency.

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3.2. Course description

Generic information		
Head of Course	**Nikola Lopac, PhD**	
Course	**Fundamentals of Electrical Engineering 1**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Mandatory**	
Year of Study	**1st**	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	7
	Number of Hours (L+E+S)	45+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are to introduce students to the fundamental laws of electric and magnetic fields, to develop the ability to solve problem-based tasks in the field of electric and magnetic fields, and to explain key concepts and quantities in direct current (DC) circuits, while enabling students to analyze and calculate DC electrical quantities.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

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

1. Explain the fundamental laws of electric fields and demonstrate their application through examples.
2. Calculate and interpret electric potential and voltage in the context of electric fields.
3. Explain the fundamental laws of magnetic fields and demonstrate their application through examples.
4. Describe and analyze the effects of magnetic fields in various configurations.
5. Recognize and explain the fundamental concepts and quantities in DC circuits.
6. Apply the basic circuit laws to calculate current, voltage and power in DC circuits.

1.4. Course Outline

Electric charge. Conductors, insulators and semiconductors. Coulomb's law. Electric field. Work in an electric field. Electric potential. Equipotential surfaces. Voltage. Matter in an electric field. Electric capacitance and capacitors. Capacitor in a DC circuit. Energy of a charged capacitor. Magnetic field. Magnetic flux and induction. Action of a magnetic field on a moving charge, current-carrying conductor and moving conductor. Electromagnetic induction. Lenz's law. Self-induction and mutual induction. Magnetic energy of an inductor. Matter in a magnetic field. Magnetic circuits. Definition of electric current. DC electric circuit. Ohm's law. Kirchhoff's first and second law. Analysis of DC networks using Kirchhoff's laws. Real and ideal DC sources. Electrical resistance. Resistors. Resistor connections. Electrical energy and DC power. Measurement of current, voltage, resistance and power. Methods for solving linear DC networks.

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

1st midterm exam, 2nd midterm exam, 3rd midterm exam, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	2.5	Class participation		Seminar paper		Experiment	
Written exam	1.5	Oral exam		Essay		Research	
Project		Continuous Assessment	3	Presentation		Practical work	
Portfolio							

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

The assessment and evaluation of achieved learning outcomes are conducted in accordance with the *Regulations on Study and Studying at the University of Rijeka* and the *Regulations on Studying at the University of Rijeka, Faculty of Maritime Studies*.

Achieved learning outcomes are assessed and evaluated during classes (continuous monitoring and evaluation) and in the final exam.

The evaluation of achieved learning outcomes in the course is expressed in percentage grade points on a 0–100% scale, where the minimum passing grade is at least 50% of the grade points.
Through continuous evaluation of achieved learning outcomes (during classes), the student can obtain 70% of the grade points, while the remaining 30% of the grade points can be obtained in the final exam.

Continuous evaluation of achieved learning outcomes (during classes) is conducted through three midterm exams. Each midterm exam consists of a written assessment of the corresponding achieved learning outcomes, and a certain percentage of grade points can be obtained as follows:

- 1st midterm exam: learning outcomes 1–2 – 23% of the grade points,
- 2nd midterm exam: learning outcomes 3–4 – 23% of the grade points,
- 3rd midterm exam: learning outcomes 5–6 – 24% of the grade points.

A student who achieves less than 35% of grade points in total across the three midterm exams will be allowed during classes to retake the midterm exam in which the lowest percentage of grade points was achieved (make-up midterm exam). A student has the right to take the make-up midterm exam once.

A student who in continuous evaluation achieves:

- from 0% to 34% of the grade points is not eligible to take the final exam and must re-enroll in the course,
- 35% or more of the grade points is eligible to take the final exam.

The final exam consists of a written assessment of achieved learning outcomes (learning outcomes 1–6).

In the final exam, the student must achieve at least 15% of the grade points (50% of the grade points available in the final exam) to pass the course.

A student has the right to take the final exam for the course up to three times during the academic year.

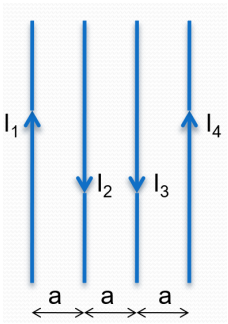
For students who have met the conditions for passing the course, the final grade in the course is the sum of the grade points obtained through continuous monitoring and evaluation and the grade points obtained in the final exam.

The grade awarded for the achieved learning outcomes in the course is determined in accordance with the percentage ranges of grade points defined in the *Regulations on Studying at the University of Rijeka, Faculty of Maritime Studies*.

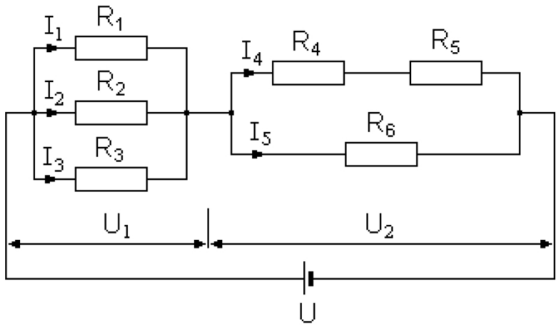
[1] **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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

1. A body represented as a point charge $+Q1 = 8.5 \cdot 10^{-9}$ C is located in air. Calculate the electric field strength at a distance $r = 25$ cm and the force this field exerts on a second body with charge $+Q2 = 0.5 \cdot 10^{-9}$ C located at that point.
2. Determine the electric potential at point P located at distance $r = 125$ cm from the center of a positively charged metallic sphere of charge $Q = 80$ nC. The sphere is in air and its radius is $R = 100$ cm. Draw a graph of potential versus distance r. Assume the reference point is at infinity.
3. Determine the magnetic field strength at distances $r_1 = 0.2$ m and $r_2 = 3.5$ m from a very long straight conductor of radius $R = 1$ m carrying a current $I = 0.5$ A. Draw a graph of magnetic field strength versus distance r.
4. Four infinitely long, parallel, thin conductors in air carry currents of equal magnitude $I = 50$ A in directions indicated in the diagram. The conductors are equally spaced at distance $a = 0.2$ m. Calculate the force per unit length acting on conductor 1 and indicate its direction.



5. Two resistors $R_1 = 40\ \Omega$ and $R_2 = 60\ \Omega$ connected in series are supplied with a constant voltage $U = 100$ V. Determine the total resistance R_{uk}, current I, and voltage drops U_1 and U_2 across the resistors.
6. Resistors with known values $R_1 = 2\ \Omega$, $R_2 = 2\ \Omega$, $R_3 = 4\ \Omega$, $R_4 = 5\ \Omega$, $R_5 = 3\ \Omega$, $R_6 = 2\ \Omega$ are connected as shown in the diagram. The network voltage is $U = 120$ V. Determine the current values in all branches of the network I_1, I_2, I_3, I_4 and I_5 and the voltages in the parallel branches U_1 and U_2.



1.10. Main Reading

1. Course materials available on the Merlin e-learning platform (https://moodle.srce.hr)
2. B. Kuzmanović: Osnove elektrotehnike I, Element, Zagreb, 2011

1.11. Recommended Reading

1. B. Blašković, M. Dadić, D. Pintar, M. Randić, B. Trkulja, M. Vranić: Osnove elektrotehnike, Element, Zagreb, 2022
2. V. Pinter: Osnove elektrotehnike – Knjiga prva, Tehnička knjiga, Zagreb, 1994
3. N. Lopac, N. Bulic, N. Vrkic: Sliding Mode Observer-Based Load Angle Estimation for Salient-Pole Wound Rotor Synchronous Generators, Energies, 2019, 12, 1609
4. C. K. Alexander, M. N. O. Sadiku: Fundamentals of Electric Circuits, McGraw Hill, New York, 2020

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

Course materials available on the Merlin e-learning platform (https://moodle.srce.hr)	web	70
B. Kuzmanović: Osnove elektrotehnike I, Element, Zagreb, 2011	3	70

1.13. Quality Assurance

The quality of teaching is continuously monitored in accordance with the ISO 9001 system implemented at the University of Rijeka, Faculty of Maritime Studies. An annual analysis of exam results is conducted, and student surveys are carried out each semester

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3.2. Course description

Generic information		
Head of Course	**Nikola Lopac, PhD**	
Course	**Fundamentals of Electrical Engineering 2**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Mandatory**	
Year of Study	**1st**	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	7
	Number of Hours (L+E+S)	45+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of the course are to introduce students to transient phenomena in direct current (DC) circuits, to develop the ability to analyze and calculate electrical quantities in alternating current (AC) circuits, and to explain the operating principles of three-phase systems.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

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

1. Explain and interpret transient phenomena in DC circuits.
2. Apply Kirchhoff's laws and complex numbers for calculating currents and voltages in basic AC circuits with series and parallel impedance connections.
3. Calculate and analyze active, reactive and apparent power in AC circuits.
4. Calculate electrical quantities in AC circuits with mutually coupled inductors.
5. Apply network analysis methods for calculating electrical quantities in more complex AC circuits with various source and impedance configurations.
6. Calculate phase and line electrical quantities in three-phase systems with star and delta connections.

1.4. Course Outline

Transient phenomena in DC circuits. Periodic AC electrical quantities. Parameter characterization of periodic electrical quantities (RMS and average values). Sinusoidal alternating quantities. Use of complex numbers in AC network analysis. Elements of AC circuits. Electrical impedance. Ohm's law. Active, inductive and capacitive resistance in AC circuits. Measuring instruments in AC circuits. Kirchhoff's first and second law. Analysis of AC circuits using Kirchhoff's laws. Active, reactive and apparent power in AC circuits. Power factor. Resonance (series and parallel) in AC circuits. Mutual inductance in AC circuits. AC network solving methods (mesh current method, Thevenin's theorem, maximum power transfer theorem, Norton's theorem). Three-phase AC systems. Star and delta source connections. Star and delta load connections. Relationship between line and phase quantities in three-phase sources depending on the connection type. Relationship between line and phase quantities in symmetrical and asymmetrical three-phase loads depending on the connection type. Power in three-phase systems. Practical applications of three-phase systems.

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

1st midterm exam, 2nd midterm exam, 3rd midterm exam, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	2.5	Class participation		Seminar paper		Experiment	
Written exam	1.5	Oral exam		Essay		Research	
Project		Continuous Assessment	3	Presentation		Practical work	
Portfolio							

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

The assessment and evaluation of achieved learning outcomes are conducted in accordance with the *Regulations on Study and Studying at the University of Rijeka* and the *Regulations on Studying at the University of Rijeka, Faculty of Maritime Studies*.

Achieved learning outcomes are assessed and evaluated during classes (continuous monitoring and evaluation) and in the final exam.

The evaluation of achieved learning outcomes in the course is expressed in percentage grade points on a 0–100% scale, where the minimum passing grade is at least 50% of the grade points.
Through continuous evaluation of achieved learning outcomes (during classes), the student can obtain 70% of the grade points, while the remaining 30% of the grade points can be obtained in the final exam.

Continuous evaluation of achieved learning outcomes (during classes) is conducted through three midterm exams. Each midterm exam consists of a written assessment of the corresponding achieved learning outcomes, and a certain percentage of grade points can be obtained as follows:

- 1st midterm exam: learning outcomes 1–2 – 23% of the grade points,
- 2nd midterm exam: learning outcomes 3–4 – 23% of the grade points,
- 3rd midterm exam: learning outcomes 5–6 – 24% of the grade points.

A student who achieves less than 35% of grade points in total across the three midterm exams will be allowed during classes to retake the midterm exam in which the lowest percentage of grade points was achieved (make-up midterm exam). A student has the right to take the make-up midterm exam once.

A student who in continuous evaluation achieves:

- from 0% to 34% of the grade points is not eligible to take the final exam and must re-enroll in the course,
- 35% or more of the grade points is eligible to take the final exam.

The final exam consists of a written assessment of achieved learning outcomes (learning outcomes 1–6).

In the final exam, the student must achieve at least 15% of the grade points (50% of the grade points available in the final exam) to pass the course.

A student has the right to take the final exam for the course up to three times during the academic year.

For students who have met the conditions for passing the course, the final grade in the course is the sum of the grade points obtained through continuous monitoring and evaluation and the grade points obtained in the final exam.

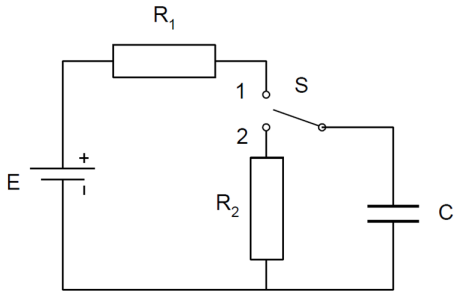
The grade awarded for the achieved learning outcomes in the course is determined in accordance with the percentage ranges of grade points defined in the *Regulations on Studying at the University of Rijeka, Faculty of*

[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.

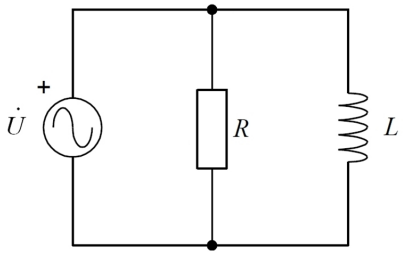
Maritime Studies.

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

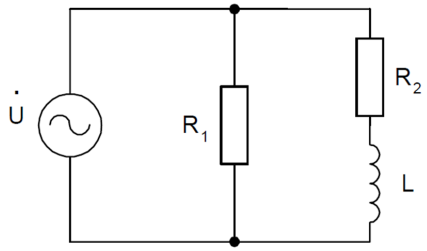
1. In the given circuit, switch S is moved to position 1. The switching time is negligible. Assume the capacitor was initially uncharged. Determine and sketch the current and capacitor voltage curves, and the voltage across the resistor, given: R_1 = 500 Ω, C = 7 μF and E = 50 V.



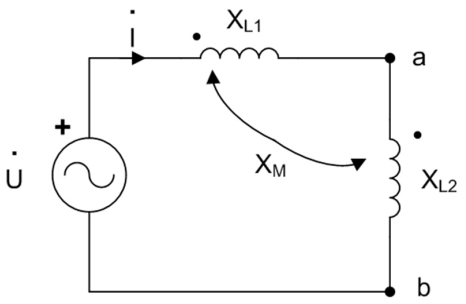
2. For the parallel RL circuit, determine the complex currents and voltages and draw the phasor diagram. Given: U = 110 V, R = 110 Ω and φ_{UI} = 60°.



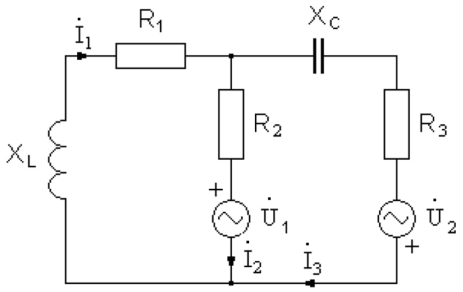
3. For the network shown, determine apparent, active, and reactive power, and calculate cosφ_{UI}. Draw the power triangle. Given: R_1 = 210 Ω, R_2 = 75 Ω, L = 300 mH, U = 12 V and f = 50 Hz.



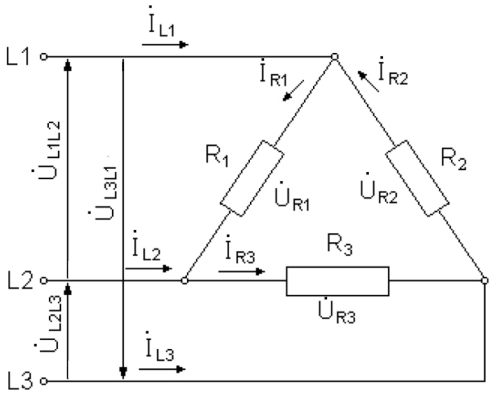
4. Determine the voltage U_{ab} in the given circuit. Given: I = 3 A, X_{L1} = 2 Ω, X_{L2} = 2 Ω and X_M = 2 Ω.



5. In the network shown, the source voltages are U_1 = -124 - j120 V and U_2 = 112 + j84 V. The resistances are R_1 = 10 Ω, R_2 = 6 Ω and R_3 = 2 Ω, and the inductive and capacitive reactances are X_L = 12 Ω and X_C = 6 Ω. Use the mesh current method to determine the branch currents.



6. A symmetrical three-phase system with a line voltage of 400 V (RMS) is connected to three resistors of 40 Ω in delta connection as shown. Calculate the phase and line currents and the total active power of the load.



1.10. Main Reading

1. Course materials available on the Merlin e-learning platform (https://moodle.srce.hr)
2. B. Kuzmanović: Osnove elektrotehnike II, Element, Zagreb, 2011

1.11. Recommended Reading

1. B. Blašković, M. Dadić, D. Pintar, M. Randić, B. Trkulja, M. Vranić: Osnove elektrotehnike, Element, Zagreb, 2022
2. V. Pinter: Osnove elektrotehnike – Knjiga druga, Tehnička knjiga, Zagreb, 1994
3. N. Lopac, N. Bulic, N. Vrkic: Sliding Mode Observer-Based Load Angle Estimation for Salient-Pole Wound Rotor Synchronous Generators, Energies, 2019, 12, 1609
4. C. K. Alexander, M. N. O. Sadiku: Fundamentals of Electric Circuits, McGraw Hill, New York, 2020

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Course materials available on the Merlin e-learning platform (https://moodle.srce.hr)	web	70
B. Kuzmanović: Osnove elektrotehnike II, Element, Zagreb, 2011	3	70

1.13. Quality Assurance

The quality of teaching is continuously monitored in accordance with the ISO 9001 system implemented at the University of Rijeka, Faculty of Maritime Studies. An annual analysis of exam results is conducted, and student surveys are carried out each semester

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3.2. Course description

Generic information		
Head of Course	**Nikola Lopac, PhD**	
Course	**Fundamentals of Automation**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Mandatory**	
Year of Study	**2nd**	
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 main objectives of the course are to introduce students to the basics of mathematical modelling of linear systems and the analysis of their dynamic characteristics, to develop the ability to apply PID controllers and adjust their parameters, to explain the functions of elements of automatic control systems, to enable students to program simple control systems using PLCs, and to familiarize them with the most commonly used sensors and actuators in automation.

1.2. Prerequisites for Course Registration

None.

1.3. Expected Learning Outcomes

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

1. Apply the Laplace transform for mathematical modelling of simple linear systems.
2. Determine the system transfer function and calculate the step and impulse response.
3. Explain the working principle of the PID controller and apply Ziegler–Nichols rules for parameter tuning.
4. Identify elements of automatic control systems and explain their functions in the automation process.
5. Explain the operating principle of a Programmable Logic Controller (PLC) and program basic control functions of simple systems using a PLC.
6. Recognize the most commonly used sensors and actuators in process automation and describe their basic characteristics and working principles.

1.4. Course Outline

Laplace transform. Mathematical modelling of systems. Transfer function of the system. Step and impulse response of the system. System representation using block diagrams. Block algebra. Basic control system structure (control loop). Applications of automatic control. Controllers. PID controller. Implementations of PID controllers. Indicators of control system response quality. Ziegler–Nichols rules for PID controller tuning. Elements of automatic control systems. Programmable Logic Controller (PLC). PLC components. PLC programming. Supervisory Control and Data Acquisition (SCADA). Sensors (measuring elements). Characteristics, operating modes and applications of sensors in process automation. Actuators (executive elements) in process automation.

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

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	☐ Field work	☐ Other _____
1.6. Comments		
1.7. Student Obligations		
1st midterm exam, 2nd midterm exam, laboratory exercises, final exam		

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	1.5	Presentation		Practical work	0.5
Portfolio							

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

The assessment and evaluation of achieved learning outcomes are conducted in accordance with the *Regulations on Study and Studying at the University of Rijeka* and the *Regulations on Studying at the University of Rijeka, Faculty of Maritime Studies*.

Achieved learning outcomes are assessed and evaluated during classes (continuous monitoring and evaluation) and in the final exam.

The evaluation of achieved learning outcomes in the course is expressed in percentage grade points on a 0–100% scale, where the minimum passing grade is at least 50% of the grade points.
Through continuous evaluation of achieved learning outcomes (during classes), the student can obtain 70% of the grade points, while the remaining 30% of the grade points can be obtained in the final exam.

Continuous evaluation of achieved learning outcomes (during classes) is conducted through two midterm exams and practical work in laboratory exercises, through which the corresponding achieved learning outcomes are verified, and a certain percentage of grade points can be obtained as follows:

- 1st midterm exam: learning outcomes 1–3 – 25% of the grade points,
- 2nd midterm exam: learning outcomes 4–6 – 25% of the grade points,
- laboratory exercises: learning outcomes 1–6 – 20% of the grade points.

Midterm exams consist of written assessments of the corresponding achieved learning outcomes. A passing threshold of 50% is defined for each midterm exam, i.e. the student must achieve at least 50% of the grade points allocated to each midterm exam. A student who does not achieve a sufficient number of grade points in a particular midterm exam will be allowed to retake that midterm exam during classes (1st and 2nd make-up midterm exam). The right to take the 1st make-up midterm exam is granted to a student who achieved less than 50% of the grade points in the 1st midterm exam, and the right to take the 2nd make-up midterm exam is granted to a student who achieved less than 50% of the grade points in the 2nd midterm exam. A student has the right to take each make-up midterm exam once.

In the laboratory exercises, students solve problem tasks using simulation tools and software for configuring and programming automation systems. The evaluation of laboratory work is carried out based on defined grading criteria, including student activity during the lab, successful problem-solving, and subject knowledge.

A student who in continuous evaluation achieves:

- from 0% to 34% of the grade points and/or does not meet the passing thresholds in one or both midterm exams (has not achieved at least 50% of the grade points allocated to each midterm exam) is not eligible to take the final exam and must re-enroll in the course,
- 35% or more of the grade points and meets the passing thresholds in both midterm exams (has achieved at least 50% of the grade points in each midterm exam) is eligible to take the final exam.

[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.

The final exam consists of a written assessment of achieved learning outcomes (learning outcomes 1–6).

In the final exam, the student must achieve at least 15% of the grade points (50% of the grade points available in the final exam) to pass the course.

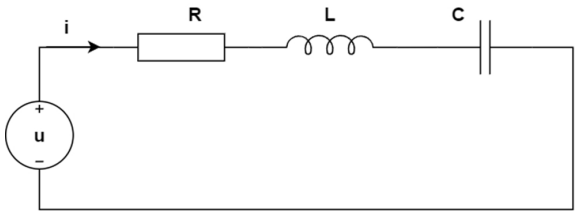
A student has the right to take the final exam for the course up to three times during the academic year.

For students who have met the conditions for passing the course, the final grade in the course is the sum of the grade points obtained through continuous monitoring and evaluation and the grade points obtained in the final exam.

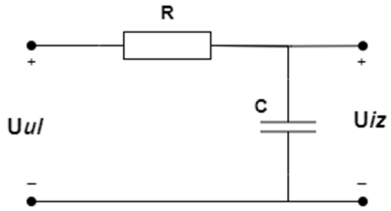
The grade awarded for the achieved learning outcomes in the course is determined in accordance with the percentage ranges of grade points defined in the *Regulations on Studying at the University of Rijeka, Faculty of Maritime Studies*.

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

1. Write the differential equation describing the behavior of the electrical system shown in the figure and use the Laplace transform to determine the transfer function of the system $G(s) = I(s)/U(s)$.



2. An electrical network is given as shown, with $R = 2$, $C = 3$. Calculate the transfer function $G(s) = U_{iz}(s)/U_{ul}(s)$ and the system response $u_{iz}(t)$ to the impulse function $u_{ul}(t) = \delta(t)$.



3. Explain the steps of the Ziegler–Nichols ultimate sensitivity method for PID controller parameter tuning.
4. List the key components of a SCADA system and explain their roles in process and plant automation.
5. Develop a PLC program in ladder diagram format for starting and stopping an electric motor. The system consists of two push buttons (TP_START and TP_STOP) and an electric motor. A short press on the TP_START button starts the motor, which continues running until the TP_STOP button is briefly pressed.
6. List two basic types of digital encoders for measuring angular displacement and rotational speed and describe their main characteristics and principles of operation.

1.10. Main Reading

1. Course materials available on the Merlin e-learning platform (https://moodle.srce.hr)
2. Z. Vukić, Lj. Kuljača: Automatsko upravljanje – analiza linearnih sustava, Kigen, Zagreb, 2005

1.11. Recommended Reading

1. N. S. Nise: Control Systems Engineering, Wiley, 2019
2. W. Bolton, Programmable Logic Controllers, Newnes, 2015
3. N. Lopac, G. Šegon, N. Bulić: Application of model-based design tool X2C in induction machine vector control, Engineering Review, 2019, 39, 1, pp. 90-104
4. Manual for PLC Automation with AC500 V3 and Automation Builder 2.7.0, ABB, 2024

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

Course materials available on the Merlin e-learning platform (https://moodle.srce.hr)	web	60
Z. Vukić, Lj. Kuljača: Automatsko upravljanje – analiza linearnih sustava, Kigen, Zagreb, 2005	5	60

1.13. Quality Assurance

The quality of teaching is continuously monitored in accordance with the ISO 9001 system implemented at the University of Rijeka, Faculty of Maritime Studies. An annual analysis of exam results is conducted, and student surveys are carried out each semester

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3.2. Course description

Generic information		
Head of Course	Marko Gulić, PhD	
Course	Informatics Fundamentals	
Study Programme	Marine Electronic Engineering and Information Technology	
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 the technologies used for data encoding in memory storage. (Outcome 1)
2. Convert the given number 756 from the octal numeral system to the hexadecimal numeral system. (Outcome 2)
3. Write a program that reads 20 numbers and prints the largest number read. (Outcomes 3 and 7)
4. Using the MS Word application, format the text according to the given specifications. (Outcomes 4 and 5)
5. Using the MS Excel application, create a chart for the given data. (Outcome 6)
6. Describe the different types of application software support. (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.
- Grundler et al., ECDL 5.0 (WINDOWS 7, OFFICE 2010): osnovni program - 7 modula, PRO-MIL, Varaždin,

[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.

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	

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	Jasmin Ćelić, PhD	
Course	Intelligent transportation systems	
Study Programme	Marine Electronic Engineering and Information Technology	
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)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of this course are to acquire basic knowledge in the field of intelligent transportation systems, as well as to get acquainted with the basic principles and techniques in the design and operation of modern systems.

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. Define the basic laws on which the ITS functionality is based.
2. Explain and demonstrate the principles of network management.
3. Describe the development of ITS.
4. Present and explain the procedures for the implementation of ITS in transport infrastructure.
5. Demonstrate the justification and benefit of ITS implementation.
6. Describe telematic solutions of the transport system.
7. Describe and present the principles of operation of electronic systems of transport entities.
8. Define the prerequisites for the development and implementation of ITS services.

1.4. Course Outline

General information on intelligent transport systems. Standards and norms. Fundamentals of systems theory and cybernetics. Physical and logical architecture of ITS. Traffic modeling. Communications in intelligent transport systems. Expert systems for the application of artificial intelligence to transport systems. Intelligent navigation system. Intelligent transport systems and control systems. Expert maintenance systems. Diagnostics in intelligent transport systems.

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

1st preliminary exam, 2nd preliminary exam, development and presentation of a research task, final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation	0.5	Seminar paper	1	Experiment	
Written exam	0.5	Oral exam	0.5	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

The procedure for evaluating the acquired learning outcomes takes place 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 acquired learning outcomes are evaluated through continuous testing of knowledge during classes:*

  through the 1st preliminary exam - learning outcomes 1.-4. (25%), 2nd preliminary exam - learning outcomes 5.-8. (25%), research task – learning outcomes 1.-8. (20%); in doing so, the student must realize a minimum of 50% of points for each preliminary exam, while the presentation of the research task is evaluated on the basis of elaborated assessment criteria;
- *at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1.-8.), whereby the student must realize a minimum of 50% of points to pass the final exam;*
- *final ECTS grade, is defined on the basis of the achieved total % of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:*
  - *the grade excellent (5) corresponds to the grade A in the ECTS scale and the success rate from 90 to 100%,*
  - *a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,*
  - *grade good (3) corresponds to grade C on the ECTS scale and a success rate of 60 to 74.9%,*
  - *a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,*
  - *the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.*

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

1. Part of the ITS life cycle may be:
   - A Physical analysis ☐
   - B Physical synthesis ☐
   - C Functional composition ☐
   - D Functional decomposition ☐ (LO #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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2. Types of control include:
   - A Feedforward control ☐
   - B Adaptive control ☐
   - C Control on demand ☐
   - D Feedback control ☐ (LO #2)

3. Physical, logical and communication point of view includes:
   - A Service ITS architecture ☐
   - B ITS Framework architecture ☐
   - C National ITS architecture ☐
   - D Mandatory ITS architecture ☐ (LO #3)

4. The basic step in the request detection process can be:
   - A User specification and problem prevention ☐
   - B User classification and troubleshooting ☐
   - C User prediction and problem separation ☐
   - D User identification and problem definition ☐ (LO #4)

5. The level of service in intelligent roads is measured by:
   - A Driving safety ☐
   - B Freedom of maneuver ☐
   - C Sensors ☐
   - D Driving comfort ☐ (LO #5)

6. ITS vehicle adaptation includes:
   - A Vehicle starting devices ☐
   - B Vehicle controls ☐
   - C Vehicle stopping devices ☐
   - D Vehicle maintenance devices ☐ (LO #6)

7. Sensors can be:
   - A MENS sensors ☐
   - B Chemical sensors ☐
   - C Magnetic sensors ☐
   - D Neon sensors ☐ (LO #7)

8. The benefits of ITS are visible in:
   - A Increase in emissions of pollutants ☐
   - B Reducing the number of road signs ☐
   - C Increasing the number of foreign guests ☐
   - D Number of employees at gas stations ☐ (LO #8)

1.10. Main Reading

1. Teaching material available on the Merlin e-learning system (https://moodle.srce.hr)
2. Bošnjak, I. (2006). Intelligent Transport Systems 1, Faculty of Transport Sciences, Zagreb, Croatia
3. Williams, B. (2008.). Intelligent Transport Systems Standards, Artech House, Boston, USA.

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1.11. Recommended Reading

- Ćelić, J., Mandžuka, B., Tomas, V., Tadić, F. (2024.). Driver-centric urban route planning: Smart search for parking, Sustainability 16 (2), 856.
- Grupa autora. (2000.). Intelligent Transportation Primer, Institute of Transportation Engineers, Washington, USA.
- Chen, Y., Li, L. (2013.). Advances in Intelligent Vehicles, Elsevier, Academic Press.
- Zilouchian, A., Jamshidi, M. (2001.). Intelligent Control Systems Using Soft Computing Methodoligies, CRC Press, London, UK.
- Gupta, M., Sinha, N. K. (1995.). Intelligent Control Systems - Concept and Applications, IEEE Press, Piscataway NJ, USA.
- Internet:
  - http://local.iteris.com/arc-it/
  - http://its.dot.gov/
  - https://www.itsa.org/technology-scan-assessments
  - https://www.etsi.org/technologies/
  - https://www.pcb.its.dot.gov/eprimer/default.aspx
  - https://www.ieee-itss.org/its-transactions

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Bošnjak, I. (2006). Intelligent Transport Systems 1, Faculty of Transport Sciences, Zagreb, Croatia	10	40
Williams, B. (2008.). Intelligent Transport Systems Standards, Artech House, Boston, USA.	10	40

1.13. Quality Assurance

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

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3.2. Course description

Generic information		
Head of Course	Marko Gulić, PhD	
Course	Internet Technologies	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
Year of Study	2nd	
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 main objectives of the course are to acquire knowledge about technologies used for Internet operations, including architecture, protocols, services, and computer security. Students will develop skills in creating websites using HTML for structure, CSS for styling, and JavaScript for interactivity.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Identify key components of Internet architecture, network protocols, and services, and describe how computer networks operate.
2. Define and explain fundamental Internet technology concepts such as IP addresses, protocols, and cybersecurity.
3. Demonstrate effective information searching and the use of Internet resources.
4. Apply HTML to create the structure of web pages using basic elements.
5. Apply CSS to style and organize elements within a web page.
6. Illustrate the use of JavaScript to create interactive components on a web page.
7. Develop websites using web development tools and demonstrate their functionalities.

1.4. Course Outline

Internet architecture and computer networks. Computer protocols and IP addresses. Basics of computer security on the Internet. Internet services and service providers. Techniques and tools for effective information retrieval on the Internet. Application of HTML to create the structure of web pages using basic elements. CSS for styling and organizing elements within a page. Illustration of the use of JavaScript and web development tools to create interactive components and demonstrate their functionalities.

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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	Classes are conducted through a combination of classroom instruction and individual work in the computer laboratory. Upon enrolment in the course, students will be directed to use the online learning platform. A detailed schedule of lectures and exercises will be published in the course implementation plan.	

1.7. Student Obligations

- Regularly attend classes (lectures and exercises) and take short quizzes at the beginning of each exercise session
- Take the 1st and 2nd midterm exams
- Create and present a project assignment
- Take the final (written/oral) exam if the requirements for attendance and assessment have been met

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	1	Essay		Research	
Project	0,5	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 assessment during classes accounts for 70% of the achieved learning outcomes:
  – Midterm Exam 1 – Learning Outcomes 1–3 (20%)
  – Midterm Exam 2 – Learning Outcomes 4–7 (20%)
  – Project assignment – learning outcomes 1–7 (20%)
  – Quick quizzes during exercises – Learning Outcomes 1–7 (10%)
  In each midterm exam, the student must achieve at least 50% of the total points.

- The final (oral) exam accounts for 30% of the achieved learning outcomes (1-7), and the student must achieve at least 50% of the points on the final exam to pass.

Examples of assessment tasks aligned with learning outcomes:

1. List the main elements of Internet architecture and explain their function.
2. Explain the role of IP addresses and security protocols on the Internet.
3. Demonstrate steps for effective information retrieval on the Internet.
4. Create a simple web page using basic HTML elements.
5. Style a web page using CSS rules for layout and appearance.
6. Add a JavaScript component that enables interactivity on a web page.

[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.

7. Develop a functional website using web development tools.

1.10. Main Reading

• Olivier Bonaventure: Computer Networking : Principles,Protocols and Practice, 2021., available online https://www.computer-networking.info/

• Shay Howe: Learn To Code Html And Css, Adams Media, 2014., available online https://learn.shayhowe.com/

• Marijn Haverbeke: Eloquent JavaScript, 2024., available online https://eloquentjavascript.net/

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

1.11. Recommended Reading

• Fred T Hofstetter: Internet Technologies at Work, 2004.,Career Education, University of Delaware

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Olivier Bonaventure: Computer Networking : Principles,Protocols and Practice	unlimited	40
Shay Howe: Learn To Code Html And Css	unlimited	40
Marijn Haverbeke: Eloquent JavaScript	unlimited	40
E-course teaching materials available on the Merlin e-learning system	unlimited	40

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	Sanjin Valčić, PhD		
Course	Laboratory and skills		
Study Programme	Marine Electronic Engineering and Information Technology		
Type of Course	Mandatory		
Year of Study	1		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		0+45+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The main objectives of this course are the acquisition of basic knowledge and skills on a platform for creating electronic prototypes, based on circuitry and programming tools.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

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

1. *List the programming and physical elements of the platform for creating electronic prototypes, based on the circuit board and programming tool.*
2. *Use the circuit diagram to connect the platform for creating electronic prototypes and electronic elements.*
3. *Apply the acquired knowledge to create pseudocode and program code to control the created electronic prototype.*
4. *Carry out verification and execution of the program code to control the created electronic prototype.*
5. *Demonstrate control of the created electronic prototype.*

1.4. Course Outline

Introduction to laboratory equipment. Introduction to the Arduino platform. Structure and components of the Arduino platform and development environment. Programming the Arduino microcontroller in the Arduino development environment. Controlling the blinking of a light-emitting diode. Controlling circuits with multiple light-emitting diodes. Regulating the brightness of light-emitting diodes. Controlling a standard servomotor. Simulating the operation of a windshield wiper. Making a musical keyboard. Using a light sensor. Making a laser radar. Using a temperature sensor.

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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

Regular course attendance, 1st midterm exam, 2nd midterm exam, 3rd midterm exam, final exam

1.8. Assessment[1] of Learning Outcomes

Course attendance	1.5	Class participation	0.5	Seminar paper		Experiment	
Written exam		Oral exam	1	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

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:

- *70% of the acquired learning outcomes are assessed through continuous assessment during classes; through 1st midterm exam – learning outcomes 1-3 (20%), 2nd midterm exam – learning outcomes 1-3 (20%), 3rd midterm exam – learning outcomes 1-3 (20%)*
- *Through class activities (10%)*

In the final part of the exam, 30% of the acquired learning outcomes (1-5) are evaluated, and in order to pass the final exam, the student must achieve a minimum of 50% of the grade points.

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

1. *What are the main functions that every Arduino "Sketch" must have?*
2. *Complete the alarm system assembly with a piezo buzzer, LEDs, and a phototransistor using the given electronic schematic and wiring diagram.*
3. *It is necessary to fill in the blank lines in the code in order for the program to execute successfully, that is, so that the LED can be turned on by pressing the button and turned off by releasing the button.*
4. *Check and execute the created program code for simulating a traffic light and fix the errors.*
5. *Perform measurement and acquisition of data on temperature and light intensity in the room.*

1.10. Main Reading

1. *Valčić, S. (2024). Laboratory and skills. Authorized materials from exercises, Faculty of Maritime Studies in Rijeka, Rijeka, Croatia*
2. *Course teaching materials available on the Merlin e-learning system (https://moodle.srce.hr)*

1.11. Recommended Reading

1. *Arduino Documentation, online Arduino documentation available at https://docs.arduino.cc/*
2. *Banzi, M., Shiloh, M. (2014). Getting Started with Arduino. 3rd Edition. Maker Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA, USA*
3. *Hughes, J.M. (2016). Arduino: A Technical Reference. O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA, USA*
4. *Monk, S. (2023). Programming Arduino® - Getting Started with Sketches. 3rd Edition. McGraw Hill, USA*

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Valčić, S. (2024). Laboratory and skills. Authorized materials from exercises, Faculty of Maritime Studies in Rijeka, Rijeka, Croatia	*Available online*	*100*
Course teaching materials available on the Merlin e-learning system (https://moodle.srce.hr)	*Available online*	*100*

1.13. Quality Assurance

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

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3.2. Course description

Generic information		
Head of Course	Robert Baždarić, Ph.D.	
Course	Maintenance of electronic systems	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Mandatory	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	4
	Number of Hours (L+E+S)	30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

Understand the analytical and structured systematic approach to the maintenance and its support methods of electronic systems. The focus is on the ship processes, their maintenance resources in the area of economic exploitation, the end product of which are direct maintenance tasks. They serve the purpose of maintaining the safety, reliability and availability of both individual electronic systems and entire ship processes during active operation.

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 basic concepts and quantities that characterized the faulty or functional state of an electronic system
2. Explain the purpose and types of maintenance, maintenance support, and maintenance resources
3. Explain the elements of maintenance costs
4. Explain the processes of maintenance management
5. Describe modern approaches and methods in maintenance
6. Identify and explain Identify and explain the specifics of maintenance of telecommunication, IT and marine electronic systems.

1.4. Course Outline

Basic terms and definitions (system and components, failure, recovery, reliability, availability, maintainability, dependability, security). Maintenance, maintenance support and system maintenance resources. Aspects of maintenance during the lifetime of the system. Characteristic maintenance processes. Corrective and preventive maintenance. Reliability-orientated maintenance. E-maintenance. Failures during maintenance. Maintenance and maintenance cost management. Specifics of maintenance, maintenance support and maintenance resources of telecommunication, information and marine electronic 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		
Attendance in the course, 1st colloquium, 2nd colloquium and final examination.		
1.8. Assessment[1] of Learning Outcomes		

Course attendance	2	Class participation	0,25	Seminar paper		Experiment	
Written exam	0,5	Oral exam	0,5	Essay		Research	
Project		Continuous Assessment	0,25	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 the lessons. Through the 1st colloquium - learning outcomes 1-4 (35%), the 2nd colloquium - learning outcomes 1-6 (35%).
- Compulsory final examination covering 30% of the acquired learning outcomes (1-6). The student must achieve at least 50% of the points in the written and oral parts of the examination in order to pass the final examination.

In addition, based on the results in the continuous assessment, the student can decide whether to take the exams during class and replace the written part of the final examination if previous success permits it.

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

1. The failure of a redundant electronic system is a random event characterized by the fact that one of the components of this system is no longer able to fulfil its function.
   ☐ DA ☐ NE
2. The maintenance of any electronic system must include both preventive and corrective maintenance of that system..
   ☐ DA ☐ NE
3. Most of the total costs over the lifetime of a complex electronic system are incurred during the period of use and maintenance of this system.
   ☐ DA ☐ NE
4. The maintenance management of a complex electronic system consists, among other things, of monitoring the performance of basic preventive and corrective maintenance activities of this system.
   ☐ DA ☐ NE
5. The RCM programme for a complex electronic system is basically a programme for corrective maintenance of this system, which increases its reliability.
   ☐ DA ☐ NE
6. E-maintenance is the preventive and corrective maintenance of electronic information and communication systems and the provision of support for this maintenance
   ☐ DA ☐ NE

1.10. Main Reading

Ćelić, J., Kraš, A. (2019.). Održavanje i podrživost kompleksnih sustava. Sveučilište u Rijeci, Pomorski fakultet, Rijeka, Hrvatska.

1.11. Recommended Reading

- Tortorella, M. (2015.). Reliability, Maintainability and Supportability, John Wiley & Sons, USA
- Mobley, R., K. (2014.). Maintenance Engineering Handbook. McGraw-Hill Education, 8 edition, USA

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching material on the Merlin e-learning system (https://moodle.srce.hr): Ćelić, J., Kraš, A. (2019.). Održavanje i podrživost kompleksnih sustava. Sveučilište u Rijeci, Pomorski fakultet, Rijeka, Hrvatska.	NA	50

1.13.	*Quality Assurance*	
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	**Dr. sc. Vladimir Pelić**		
Course	**MARINE AUXILIARY ENGINES AND EQUIPMENT**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Type of Course	**Elective**		
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 introduce students to ship's auxiliary machinery and devices, their most common designs, operating methods, operational characteristics, and all other factors necessary for obtaining an ETO officer's certificate in accordance with the STCW Convention.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Describe and explain the operation and role of individual elements of the shaft line.
2. Describe and explain the designs and operation of ship pumps. Analyze individual types of drives and the possibility of regulating pump supply.
3. Describe and explain the designs and operating principles of ship compressors and fans.
4. Describe and explain the designs and operating principles of ship cleaners and filters.
5. Describe and explain the designs, operating principle and control methods of the steering gear.
6. Describe and explain the designs of deck machinery (winches, cranes...).

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1.4. Course Outline

Introduction. Ship propulsion. Shaft line. Shaft line elements and propellers.
Ship pumps – introduction. Classification, drive and regulation of pumps, application of pumps on board, special requirements. Reciprocating, piston, centrifugal, screw, gear pumps,...
Compressors and fans – introduction. Process in a compressor. Multistage compressors. Application of compressors and fans.
Filters – introduction. Application of filters and filtration materials. Simple, reversible and self-cleaning filters.
Steering gears – introduction. Steering system. Designs of steering gears and principle of operation.
Deck machinery (winches, cranes...). Centrifugal separators, fuel and oil purification.

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	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

Procedure for evaluating acquired learning outcomes:

The final grade for the course is the sum of the points that the student achieved during the course (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 partial exams – attendance at classes.
- it is necessary to achieve a minimum of 50% of the total points in each of the partial exams.

Final exam:

- tests the completeness of knowledge (learning outcomes 1-6).

Examples of evaluation of learning outcomes in relation to the set learning outcomes are:
1. Describe a modern shaft line and list all parts of the shaft line for a ship whose main propulsion engine is a two-stroke low-speed reversible diesel engine (learning outcome 1)
2. Explain the parallel and serial operation of two centrifugal pumps with the same characteristics. (learning outcome 2)
3. Explain the air supply scheme for starting the main engine, methods of regulating the compressor supply. State the requirements of the Ships Register. (learning outcome 3)
4. In the picture shown, list the main parts of the heavy fuel separator, and explain the principle of operation of the centrifugal separator. (learning outcome 4)
5. Explain the electro-hydraulic steering gear scheme. What is the difference between the main and auxiliary steering gear. State the requirements of the Ships Register. (learning outcome 5)
6. Explain the scheme of the electro-hydraulic winch and the method of controlling the winch. (learning outcome 6)

1.10. Main Reading

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	40
D.W. Smith, *Marine auxiliary Machinery*, Butterworths, London, 1983.	5	40
References (1.10. (3)) available in electronic form.	-	40

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	dr. sc. Zoran Mrak		
Course	Marine communications equipment		
Study Programme	Marine Electronic Engineering and Information Technology		
Type of Course	Compulsory		
Year of Study	3		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		4
	Number of Hours (L+E+S)		30 + 30 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goals of this unit are to familiarize students with the technical characteristics and mode of operation of GMDSS communication devices, in order to be able to independently analyze the block diagram of the device, to find and repair failures by replacing the defective module. The course program is based on the STCW Convention and "IMO Model Course 1.31".

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

It is expected that after regulating the course requirements, students will be able to:

1. State the technical characteristics of communication devices in the GMDSS system.
2. Describe the role of individual circuits in marine communication devices.
3. Analyze the operation of the device using block diagrams, and in some cases at the element level.
4. Detect individual module-level failures.
5. Test the device.

1.4. Course Outline

Marine VHF Transceiver; MF / HF transceiver - technical specifications; block diagram analysis of devices.
VHF / MF / HF DSC Devices - Technical Specifications; block diagram analysis of devices.
Radio Telex (NBDP) device and Navtex device: description of radio telex device parts; technical characteristics; block diagram analysis of devices.
Satellite Communication Devices: INMARSAT C Device - Technical Specifications; analysis of block diagrams of devices, purpose of different parts, modules and elements.
EPIRB device: performance of the device; the content of the message; registration and coding; programming EPIRB devices; basic maintenance and testing.
SART: technical characteristics and mode of operation; range of SART devices; use of SART devices; maintenance and testing.
Maintenance of marine antenna 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		
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		Presentation	1	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 total number of credits consists of 10% attendance and activity in teaching, 40% achieved by the completion of an individual assignment, and 50% in the final exam (according to the Regulations on studies of the University of Rijeka and the Regulations on study at the Faculty of Maritime Studies in Rijeka).

To create a standalone assignment:
- It is necessary to isolate, analyze and present the operation of each circuit using the technical manual of each device. The assignment is assigned to each student separately at the beginning of the semester. (40%).

Final test:
- final exam is oral, learning outcomes 1-5 (50%).
Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. State the technical characteristics of the VHF radio transmitter.
2. Describe the role of the ATU assembly in the MF / HF transmitter.
3. Explain the demodulation process in a VHF DSC receiver using the block diagram of the device.
4. Describe how the Preemphasis network assembly works in a VHF radio telephone system.
5. Explain the SART device testing procedure.

1.10. Main Reading

- IMO MODEL COURSE 1.31; SECOND CLASS RADIOELECTRONIC CERTIFICATE (GMDSS) COURSE/COMP., London 2002
- Mrak, Z.: Komunikacijski uređaji i postupci u GMDSS sustavu, Pomorski fakultet, Rijeka, 1995.
- IMO Resolutions.
- ITU-R Recommendations.
- Radio equipment technical manuals.

1.11. Recommended Reading

Agilent Technologies Educator's Corner: www.educatorscorner.com
SGC (Stoner-Goral Communications): www.sgcworld.com

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the Merlin e-learning system	unlimited	
Radio communication device technical manuals available on the Merlin e-learning system	unlimited	
Literature available at the Faculty Library	6	

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 insurance quality that is implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of transience are analyzed and yielded appropriate measures.

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3.2. Course description

Generic information		
Head of Course	**Aleksandar Cuculić, PhD**	
Course	**Marine electrical machines**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Compulsory**	
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

The objective of this course is to enable students to acquire fundamental knowledge and understanding of the key principles of marine electrical machines, in accordance with the requirements of STCW and IMO.

1.2. Prerequisites for Course Registration

Completed courses: Fundamentals of Electrical Engineering 1 and Fundamentals of Electrical Engineering 2

1.3. Expected Learning Outcomes

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

1. Identify the fundamental principles of electrical machines theory and describe how they are applied in the operation of various types of electrical machines, demonstrate the application of electrical machines in different ship systems, and analyze the impact of maritime conditions on the exploitation of electrical machines.
2. List the types and main components of transformers, explain the operating principle of transformers, demonstrate the transformer testing procedure, and analyze transformer performance under different operating conditions.
3. Recognize the main components of asynchronous machines, describe the operating principle of asynchronous machines, demonstrate the maintenance procedure for asynchronous machines, compare different methods of asynchronous motor starting, and evaluate the performance of asynchronous motors in marine propulsion systems.
4. Name the types and components of commutator machines, explain the basic principles of operation of commutator machines, distinguish between types of excitation in commutator machines, and carry out maintenance procedures for commutator machines.
5. Describe the operation and list the components of synchronous machines, analyze the operation and performance of synchronous machines in both generator and motor modes, classify types of excitation in synchronous machines, and perform testing and maintenance procedures for synchronous machines.
6. List special types of electrical machines used on ships and provide examples of using power electronics for controlling the operation of electrical machines.

1.4. Course Outline

Fundamentals of electrical machines. Transformers. Asynchronous motors. Collector machines. Synchronous machines. Special machines. Starting methods. Electromotor drives. Testing and maintenance of electrical machines.

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] **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 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 learning outcome assessment in relation to learning outcomes 1–6:

1. Explain the application of Faraday's law in electrical machines and state its effects.
2. Sketch the equivalent circuit of a transformer and explain the role of the equivalent circuit components.
3. Identify the symbols of components on a star-delta starter wiring diagram and describe the sequence of switching operations during motor starting.
4. Demonstrate the maintenance procedure for the commutator and brushes on a direct current (DC) motor.
5. Describe the role of the automatic voltage regulator in a brushless self-excited synchronous generator.
6. List examples of the use of power electronics devices in electric motor drives.

1.10. Main Reading

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

1.11. Recommended Reading

1. B.Skalicki, J.Grilec, Električni strojevi i pogoni , Fakultet strojarstva i brodogradnje, Zagreb 2005.
2. Prenc, Rene ; Cuculić, Aleksandar ; Capuder, Tomislav ; Guerrero, Josep M. Optimal siting and sizing of DG units for a MV network going through voltage transition // 2018 IEEE International Energy Conference (ENERGYCON). Institute of Electrical and Electronics Engineers (IEEE), 2018, 17894524, 6. doi: 10.1109/energycon.2018.8398822

3. Cuculić, Aleksandar ; Ćelić, Jasmin ; Prenc, Rene Marine Diesel-generator Model for Voltage and Frequency Variation Analysis During Fault Scenarios // Pomorski zbornik, 51 (2016), 1; 11-24. doi: 10.18048/2016.51.01

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the e-learning platform Merlin	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	**Aleksandar Cuculić, PhD**	
Course	**Marine electrical systems**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Compulsory**	
Year of Study	**2.**	
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 objective of this course is to enable students to acquire fundamental knowledge and understanding of the marine electrical systems, in accordance with the requirements of STCW and IMO.

1.2. Prerequisites for Course Registration

Completed courses: Electrical measurements and instrumentation and Marine electrical machines

1.3. Expected Learning Outcomes

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

1. Recognize the importance, role, and subsystems of a ship's electrical power system; identify key safety measures and rules when working with electricity and apply them in simulated and real situations; describe relevant legislative regulations and technical documentation; use standard electrical engineering symbols and diagrams.

2. Plan the basic parameters of the ship's electrical power system: power balance, short-circuit current, network voltage and frequency, number and power of installed generators.

3. Explain the process of electricity generation using synchronous generators and other sources, including emergency sources; demonstrate the procedure for parallel operation of generators; apply methods for load sharing between generators in parallel operation; analyze problems that may arise during parallel operation and propose solutions.

4. Understand the shipboard power distribution system, the design and operation of the main switchboard and emergency switchboard, and the layout of the ship's cable network; perform the procedure for restoring power after a system blackout.

5. Differentiate the operating principles and construction of protective switching devices used in ship electrical systems (circuit breakers, switches, contactors, disconnectors, relays); understand the operation and design of electrical protections, protective relays, and selectivity; operate switching devices.

6. Identify different types, design, and components of typical electric consumers on ships (electric motor drives, cathodic protection systems, cooling systems, lighting, etc.); list methods for achieving explosion protection in shipboard electrical equipment.

1.4. Course Outline

Fundamentals of electrical machines. Transformers. Asynchronous motors. Collector machines. Synchronous machines. Special machines. Starting methods. Electromotor drives. Testing and maintenance of electrical machines.

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	2,5	Class participation	0,5	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

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 – 30% of grade points
   - 2nd midterm exam – 30% of grade points

   Activities on exercises – 10% 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 learning outcome assessment in relation to learning outcomes 1–6:

1. In a simulated situation, apply safety measures when working with electricity and explain the procedure for isolating an electrical device.
2. Calculate the electrical power balance for a specific ship based on given parameters.
3. Demonstrate the procedure for synchronizing a generator (parallel operation) and apply methods for load sharing.
4. Explain the procedure for restoring power after a system blackout.
5. Develop a selective short-circuit protection plan for a specific shipboard electrical power system.
6. List methods for preventing explosions in explosion-proof electrical devices.

1.10. Main Reading

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

1.11. Recommended Reading

1. *Patel, Mukund R. Shipboard electrical power systems. Crc Press, 2021.*
2. Borstlap, René, Hans Ten Katen, and Klaas Dokkum. Ships' Electrical Systems. Dokmar, 2011.
3. Skalicki, J. Grilec, Brodski elektrini ureaji, Fakultet strojarstva i brodogradnje, Zagreb, 2000.
4. Cuculić, Aleksandar ; Draščić, Luka ; Panić, Ivan ; Ćelić, Jasmin Classification of Electrical Power Disturbances on Hybrid-Electric Ferries Using Wavelet Transform and Neural Network // Journal of marine science and engineering, 10 (2022), 9; 1190, 21. doi: 10.3390/jmse10091190
5. Panić, Ivan ; Cuculić, Aleksandar ; Ćelić, Jasmin Color-Coded Hydrogen: Production and Storage in Maritime Sector // Journal of marine science and engineering, 10 (2022), 12; 1995, 31. doi: 10.3390/jmse10121995
6. Cuculić, Aleksandar ; Panić, Ivan ; Ćelić, Jasmin ; Škrobonja, Antonio Implementation of Charging Stations for Hybrid and Electrical Ferries in Croatian Ports // Pomorski zbornik, Special edition (2022), 4; 147-160

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the e-learning platform Merlin	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	Lovro Maglić, Ph.D.	
Course	Marine environmental protection	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
Year of Study	3	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	2
	Number of Hours (L+E+S)	30+0+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to familiarize students with the principles, regulations and measures of environmental protection, especially the part related to the protection of the marine environment from pollution from ships. Therefore, the course contains material relating to the theoretical principles of the relationship between organisms and sources of pollution and technical and legislative solutions for the protection of the marine environment in accordance with the requirements of the STCW Convention.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

After learning the students will be able to:

1. describe and interpret the basic concepts of ecology;
2. explain and interpret the adverse impact of individual pollutants on biocenosis and the environment
3. analyze individual Annexes of the MARPOL 73/78 Convention
4. distinguish the documentation from the Appendices of individual MARPOL 73/78 Convention Annexes.
5. explain the procedures and measures in case of pollution of the sea from ships by various pollutants.

1.4. Course Outline

The content of the course includes the following topics: Ecology, Ecosystem, Protection of the marine environment, Marine ecosystem factors, Harmful pollutants, Ship as a source of pollution, MARPOL 73/78 Convention, Annex I (Prevention of pollution by oils), II (Prevention of pollution by bulk chemicals), III (Prevention of marine pollution by harmful substances in packaged form), IV (Prevention of marine pollution by sewage), V (Prevention of pollution by ship waste), VI (Prevention of air pollution from ships), Ballast water, Underwater antivegetative paints, Onshore reception facilities, Ship as a source of pollution.

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

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 marine environmental protection. 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	1	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	0,5	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

1. Written exam in the field of protection of the sea and marine environment, international system of marine protection and cleaning from ships (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 marine environment protection is verified (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:
- Explain the basic concepts of environmental protection (1)
- Interpret the types and impacts of marine pollution from ships (2)
- Explain the ways of protecting the sea from working pollution of the sea by oils (3)
- Describe the report on the delivery of waste from ships to shore facilities (4)
- Describe the procedures in case of severe marine pollution by harmful substances (5)

1.10. Main Reading

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

1.11. Recommended Reading

- IMO, MARPOL 73/78., Consolidated Edition, London 2022.

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	Dr. Predrag Kralj, M.Sc. Rikard Miculinić	
Course	Marine hydraulics and pneumatics	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
Year of Study	3.	
Estimated Student Workload and Methods of Instruction	ECTS student workload coefficient	4
	Number of hours (M+V+S)	2+1+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

Course		Class participation	1	Seminar paper		Experiment	

attenda nce							
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

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	**Predrag Kralj, Associate Professor, Ph.D., MS.ME., BS.ME.**	
Course	**Marine Propulsion Systems**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Elective**	
Year of Study	**2**	
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 the course is to give the students basic knowledge on ship power plant, piping systems and systems of remote operation and protection and other auxiliary systems that are important for the safety of sea transport.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

It is expected that the student will be able:
1. to interpret correctly basic marine engineering terms
2. to explain basics of propulsion engine's operation and to apply knowledge on engine room model (simulator)
3. to analyze types and characteristics of marine auxiliary systems
4. to perform assessment and maintenance of marine systems in electrical officer domain

1.4. Course Outline

Basic knowledge on marine technical terms (7.01:1.10.3.); ship propulsion plants –7.01: 1.10.1. (diesel-engine plants, steam-turbine plants, gas- turbine plants, combined plants);
Ship piping, piping elements, materials and protection, international regulation on ship systems, propulsion systems (fuel system, lubrication oil system, starting air system (7.02:1.2.1.8.); cooling water system (7.02:1.2.1.6., 1.2.2.11.-13.), steam and condensate system); general purpose system and safety systems (ballast –7.02: 1.3.1.1., bilge – 7.02:1.3.1.2., firefighting systems –7.02:1.3.1.3., ventilation, service air and control air systems (7.02:1.2.3.5.); system's exploitation, local and remote operation, and 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	-	

1.7. Student Obligations

Active participation on classes and at least 70% of presence on lessons.
Passed partial exams and successful demonstration of power plant managing skills on the engine room simulator through group type practical exams, preparing the students for their future working environment.
Passed final exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	0,5	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% during classes (two theoretical and two practical partial exams – outcomes 1 - 4) and 30% on final exam (learning outcomes 1 - 4) in accordance with the University's and Faculty's normative acts. Continuous assessment:

- Two theoretical partial exams on marine engineering (diesel-engine power plants, steam generators and turbines, auxiliary equipment, piping) (45%) – outcomes 1 – 4
- Two partial exams on engine room simulator where skill of marine engines and equipment operations is assessed (25%) – outcomes 1 – 4

On written final exam complete field of marine engineering is assessed (outcomes 1 – 4).
Examples of assessment for outcome:

1. Point main parameters on the diagram of the heat process (outcome 2)
2. List main construction elements of the diesel engine (outcomes 1, 2)
3. Demonstrate the knowledge of auxiliary system and basic methods for its evaluation (outcomes 3, 4)

Students 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 seminar paper. The sum of points achieved through respected partial exam is increased by the points calculated in accordance with =seminar paper mark*5% but the sum of points for the partial exam could not be exceeded. The theme is determined at the beginning of the semester and it must be delivered before the end of it.
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, Web udžbenik na internetskoj stranici fakulteta
2. Kralj Predrag, nastavni materijali na osobnoj internetskoj stranici i u sustavu Merlin.

1.11. Recommended Reading

1. Ozretić Velimir, Brodski pomoćni strojevi i uređaji, Ship management, Split, 1996.
2. Knak Christen, Diesel Motor Ships – Engines and Machinery, G-E-C GAD Publishers, Copenhagen, 1979.
3. 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
4. Glujić, D., Kralj, P., Bernečić, D., *SCR and Fuel-Water Emulsion Equipment Influence on the Two-stroke Ship Engine Fuel Oil Consumption and Harmful Gasses Emission Analysis*, 4th International Conference on Smart & Green Technology for Shipping and Offshore Decommissioning (SMATECH 2023), 24-25 April 2023,

[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.

ONLINE
5. 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
6. Martinović Dragan*, Brodski strojni sustavi, Rijeka, 2005.*
7. Matković Milan, *Protupožarna zaštita na brodovima*, Pomorski fakultet, Rijeka, 1995.
8. Martinović Dragan, *Strojarski priručnik za časnike palube*, Graftrade, Rijeka

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Kralj Predrag, Brodski energetski sustavi, web izdanje	web	40
Kralj Predrag, nastavni materijali	web	
Martinović Dragan, Brodski strojni sustavi, Rijeka, 2005.	Biblioteka 7 Skriptarnica 0	
Matković Milan, *Protupožarna zaštita na brodovima*, Pomorski fakultet, Rijeka, 1995.	Biblioteka 14 Skriptarnica 500	
Martinović Dragan, *Strojarski priručnik za časnike palube*, Graftrade, Rijeka	Biblioteka 5 Skriptarnica 0	

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	**Igor Vio, PhD**	
Course	**Maritime Law**	
Study Programme	**Department of electrical engineering, automation and computing**	
Level	**Undergraduate degree programme**	
Type of Course	**Elective**	
Year of Study	**3**	
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.
2. To enumerate and interpret rules and regulations of international maritime law governing the safety of navigation and the protection of the marine environment and explain the structure and describe the activities of the International Maritime Organization (IMO) and the European Maritime Safety Agency (EMSA).
3. To describe organization of the maritime administration in the Republic of Croatia.
4. 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.
5. To explicate the legal regulation of the maritime domain and seaports in the Republic of Croatia and the method of their use.
6. 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	0,3	Seminar paper		Experiment	
Written exam	1,0	Oral exam		Essay		Research	
Project		Continuous Assessment	0,7	Presentation		Practical work	

[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.

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)
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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3.2. Course description

Generic information			
Head of Course	**dr. sc. Zoran Mrak**		
Course	**Maritime radiocommunications**		
Study Programme	Undergraduate		
Type of Course	Compulsory		
Year of Study	2		
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload		6
	Number of Hours (L+E+S)		30+30+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objectives of this unit are to gain knowledge of the GMDSS system required to properly handle communications devices on board, and to prepare students for the title of General Operator (GOC). The course syllabus is based on the STCW Convention and "IMO Model Course 1.25", with the addition of a necessary part in which the required backgrounds in electronic communications are addressed.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

It is expected that students, after regulating the anticipated obligations from this course, will be able to:

1. Describe the modes of propagation of electromagnetic waves as a function of frequency bands
2. Describe the basic elements of radio communication systems (receiver, modulation transmitter, antennas, transmission lines)
3. Indicate the role of individual maritime communications institutions
4. Define and describe the individual elements of the GMDSS system
5. Describe individual communication equipment
6. Indicate the purpose of each communication equipment
7. Handle all ship communication equipment in the GMDSS system
8. Use the devices in the proper manner for the purpose of proper communication
9. Use the supporting literature of the ship's radio station and keep documentation properly.

1.4. Course Outline

Development of maritime communications; The role of individual institutions; Introduction to radiocommunication systems; Information; Analog and digital systems; Electromagnetic waves, modulations, antennas, transceiver ...; GMDSS system; Communication functions; Areas of navigation; MSI Transmission Systems; Marine Communication Equipment (DSC system; VHF radiotelephone transceiver; MF / HF radiotelephone device; NAVTEX system and receiver; INMARSAT devices; SART and AIS SART device; EPIRB devices); Procedures in radio communications (routine communications, communications in the event of danger, emergency and safety ...); Use of compulsory marine literature and radio logging.

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 lectures and exercises are fully compliant with the STCW Convention and "IMO Model Course 1.25". The exercises take place in a specialized simulator for GMDSS communication devices.	

1.7. Student Obligations

Active attendance and at least 70% of course attendance; 2 written and one oral colloquium; final written exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	2	Class participation		Seminar paper		Experiment	
Written exam	2	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.

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

The total number of credits consists of 10% attendance and activity in teaching, 60% achieved through continuous examination and 30% in the final exam.

Continuous assessment:
- 1st colloquium, written test 20 questions, learning outcomes 1-3 (20%)
- 2nd colloquium, written test 20 questions, learning outcomes 4-6 (20%)
- 3rd colloquium, oral-practical simulator work - knowledge of devices, procedures and communication, learning outcomes 4-9 (20%)

Final exam:
- final exam is a 30-question test, learning outcomes 1-9 (30%). The passage requires a minimum of 50% points

Examples of evaluating learning outcomes in relation to set learning outcomes are:
1. Describe the propagation of the electromagnetic waves of the HF region.
2. Describe the SSB modulation technique and indicate what types of communications are used.
3. List the communication functions for the needs of the GMDSS system prescribed by the SOLAS Convention.
4. Describe the role of MRCC in the GMDSS system.
5. Describe the parts of the MF DSC equipment.
6. Specify the purpose of the SART equipment.
7. Distress alerting procedure with the INMRSAT F-77.
8. Demonstrate the process of sending a SAFETY priority message using a VHF equipment.
9. Perform a weekly test of the device and record the test results.

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1.10. Main Reading

1. Tehnički temelji GMDSS sustava; Josip Sušanj
2. Komunikacijski uređaji i postupci u GMDSS sustavu; Zoran Mrak
3. GMDSS sustav i sigurnost plovidbe; Damir Zec
4. Handbook for marine radio communication; Graham D. Lees, William G. Williamson

1.11. Recommended Reading

1. Manual for use by the Maritime Mobile and Maritime Mobile-Satelite Services; ITU
2. GMDSS/GOC Model Training Course 1.25; IMO
3. Standard Marine Communication Phrases; IMO
4. International Code of Signals; IMO

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials (Lectures) available on the Merlin e-learning system	unlimited	
Teaching materials (Exercises) available on the Merlin e-learning system	unlimited	
Tehnički temelji GMDSS sustava; Josip Sušanj	faculty library	
Komunikacijski uređaji i postupci u GMDSS sustavu; Zoran Mrak	faculty library	
GMDSS sustav i sigurnost plovidbe; Damir Zec	faculty library	

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 insurance quality that is implemented at the Faculty of Maritime Studies in Rijeka. Once a year, the results of transience are analyzed and yielded appropriate measures.

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3.2. Course description

Generic information			
Head of Course	dr. sc. Biserka Draščić Ban, Martina Žuškin, mag. educ.		
Course	Mathematics 1		
Study Programme	Marine electronic engineering and information technology		
Type of Course	Mandatory		
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 (3 + 2 + 0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to master selected chapters of mathematics related to linear algebra and mathematical analysis.

1.2. Prerequisites for Course Registration

None

1.3. Expected Learning Outcomes

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

1. Recognize the basic concepts of linear algebra, functions of one variable, and differential calculus of functions of one variable.
2. Perform basic calculation operations with matrices, vectors, determinants.
3. Express and analyze basic results from linear algebra.
4. Interpret solutions to the derivative of a function of one variable, and limit values.
5. Analyze the course of a real function of one variable.

1.4. Course Outline

Number sets. Mathematical induction. Complex numbers. Matrices and determinants. Systems of linear algebraic equations. Fundamentals of vector calculus in three-dimensional space. Sequences and limit values. Functions: domain, limit and continuity. Second-order curves: circle, ellipse, parabola, hyperbola. Derivative and differential calculus. Basic theorems of differential calculus. Application 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		

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1.7. Student Obligations

Active participation in classes. Attendance at least 70% of lectures and exercises. Completed independent assignments, passed preliminary exams and final 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	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 student conduct and academic affairs of the University of Rijeka and the Regulations on studies at the Faculty of Maritime Studies in the following way:

- 1st Preliminary exam – 30 points Learning outcome: *1., 2., 3.*
- 2nd Preliminary exam – 30 points Learning outcome: *4., 5.*
- Attending classes and completing assignments – 10 points Learning outcome: *1. – 5.*
- Final Exam – 30 points Learning outcome: *1. – 5.*

- Student must achieve a minimum of 35 points to take the final exam.
- To pass the final exam, a student must achieve a minimum of 50% of points.
- Attendance at exercises and lectures is mandatory and student attendance will be monitored.
- Student may miss a maximum of 30% of exercises and 30% of lectures
- Student who does not participate in the work and does not achieve 35 points in class must re-enroll in the course.

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

1. Given the function f(x)=x^2+4x+3. Determine the domain of the function. Determine the zeros of the function.
2. Calculate the product of two matrices.
3. Explain what it means to solve a system of linear equations and what solutions can be?
4. Determine the extrema of the following function f(x)=x^3-4x
5. Examine the function f(x)=x/(1+x^2)

1.10. Main Reading

1. Teaching materials on the e-learning system – Merlin (https://moodle.srce.hr)
2. Grupa autora, Matematika I, Pomorski fakultet Rijeka, 2001.
3. Grupa autora, Matematika – zbirka zadataka, Pomorski fakultet Rijeka, 1999.
4. Demidovič, Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete, Danjar, d.o.o, Zagreb 2003.

1.11. Recommended Reading

1. Kurepa, S., Matematička analiza I, Tehnička knjiga Zagreb, 1970.
2. Skenderović, J., Matejčić-Ružička, V., Vježbe na računalu, Pomorski fakultet, Rijeka 2000.
3. Štambuk, Lj., Matematika I, Tehnički fakultet Rijeka, 2002.
4. https://maremathics.pfst.hr/ (e – učenje)

[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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1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials on the e-learning system – Merlin (https://moodle.srce.hr)	Online	65
Grupa autora, Matematika I, Pomorski fakultet Rijeka , 2001.	20	65
Grupa autora, Matematika – zbirka zadataka, Pomorski fakultet Rijeka , 1999.	20	65
Demidovič, Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete, Danjar,d.o.o, Zagreb 2003.	20	65

1.13. Quality Assurance

The quality of studies is constantly monitored in accordance with the ISO 9001 system implemented at the University of Rijeka, Faculty of Maritime Studies. An analysis of exam performance 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	dr. sc. Biserka Draščić Ban, Martina Žuškin, mag. educ.		
Course	Mathematics 2		
Study Programme	Marine electronic engineering and information technology		
Type of Course	Mandatory		
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 (2 + 2 + 0)

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The goal of the course is to enable students to utilize mathematical tools from integral calculus, ordinary differential equations, and multivariable functions in modeling and solving engineering-related problems.

1.2. Prerequisites for Course Registration

Passed Mathematics 1

1.3. Expected Learning Outcomes

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

1. Apply differential calculus to analyze the behavior of functions
2. Recognize and interpret the basic concepts of integral calculus of functions of one variable.
3. Recognize integrals that are elementary solvable and calculate them.
4. Calculate basic arithmetic operations with definite integrals.
5. Apply definite integrals in solving concrete problems.
6. Interpret basic arithmetic operations with functions of two variables, and methods for solving differential equations.
7. Interpret basic arithmetic operations with series, and convergence criteria.

1.4. Course Outline

Application of the differential calculus to the examination of the flow of a function. Curvature, evolute, involute. Indefinite integral, tabular integrals. Methods for integration. Integrals of rational, trigonometric and irrational functions. The definite integral. Newton - Leibniz formula. Application of the definite integral. Improper integrals. Numerical integration. Basic ordinary differential equations. Functions of several variables: basic concepts, partial derivatives, extrema. Total differential.

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. Attendance at least 70% of lectures and exercises. Completed independent assignments, passed preliminary exams and final oral 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 student conduct and academic affairs of the University of Rijeka and the Regulations on studies at the Faculty of Maritime Studies in the following way:

- 1st Preliminary exam – 30 points Learning outcome: *1., 2., 3., 4.*
- 2nd Preliminary exam – 30 points Learning outcome: *5., 6., 7.*
- Attending classes and completing assignments – 10 points Learning outcome: *1. – 7.*
- Final Exam – 30 points Learning outcome: *1. – 7.*

- Student must achieve a minimum of 35 points to take the final exam.
- To pass the final exam, a student must achieve a minimum of 50% of points.
- Attendance at exercises and lectures is mandatory and student attendance will be monitored.
- Student may miss a maximum of 30% of exercises and 30% of lectures
- Student who does not participate in the work and does not achieve 35 points in class must re-enroll in the course.

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

1. Examine the concavity/convexity of the function f(x)=x^2*ln(x)
2. Explain Newton-Leibnitz's formula
3. Calculate the integral of the function f(x)=(2x-1)/(x^2+x+1)
4. Calculate the integral of the function f(x)=x^2 sin(x) on the segment from x=1 to x=3
5. Calculate the area between the curve y=-3x^2-2x+1 and the x-axis
6. Solve the differential equation y'(y^3 +1)(1+ x^2)=xy
7. Explain Cauchy's criterion for series convergence

1.10. Main Reading

1. Teaching materials on the e-learning system – Merlin (https://moodle.srce.hr)
2. Grupa autora, Matematika II, Pomorski fakultet Rijeka, 1993.
3. Demidovič, Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete, Danjar, d.o.o, Zagreb 2003.

1.11. Recommended Reading

1. Kurepa, S., Matematička analiza I, Tehnička knjiga Zagreb, 1970.
2. Skenderović, J., Matejčić-Ružička, V., Vježbe na računalu, Pomorski fakultet, Rijeka 2000.
3. https://maremathics.pfst.hr/ (e – učenje)

[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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1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials on the e-learning system – Merlin (https://moodle.srce.hr)	Online	65
Grupa autora, Matematika II, Pomorski fakultet Rijeka, 1993.	20	65
Demidovič, Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete, Danjar,d.o.o, Zagreb 2003.	20	65

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3.2. Course description

Generic information		
Head of Course	Jasmin Ćelić, PhD	
Course	Micro and personal computers	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Compulsory	
Year of Study	3.	
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

Acquiring knowledge about the structure and principles of operation of microcomputers and personal computers.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. define and explain the structure of computers
2. define and explain the principles of operation of the microcomputer bus system
3. define and explain the principles of operation of the microcomputer memory system
4. define and explain the principles of operation of microprocessors and motherboards of personal computers
5. explain the ways of realization and principles of operation of the personal computer subsystem for data entry
6. explain the methods of realization and principles of operation of the personal computer subsystem for permanent data storage
7. explain the ways of realization and principles of operation of the multimedia subsystem of a personal computer
8. explain the ways of realization and principles of operation of the personal computer subsystem for data printing

1.4. Course Outline

The architecture of microcomputers. Von Neumann computer model. Basic functional parts of a computer, bus, memory, processor. Description of the structure and basic components of personal computers. Types of microprocessors and their performance. Motherboards and buses. Memories. Power supply. Input units. Video subsystem. Audio subsystem. I/O interfaces. Communications and network systems. Magnetic recording systems. Optical recording systems. Printing devices. Laptops. Computer design and upgrade. Diagnosis, inspection and maintenance.

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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

1st preliminary exam, 2nd preliminary exam, 3rd preliminary exam, final exam.

1.8. Assessment[1] of Learning Outcomes

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

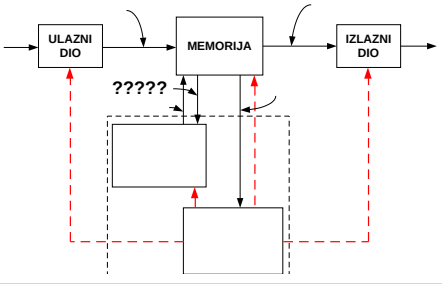
1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam

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:

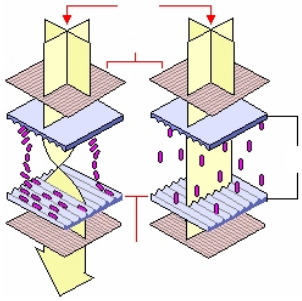
- 70% of acquired learning outcomes are evaluated through continuous testing of knowledge during classes:
  through the 1st colloquium - learning outcomes 1.-3. (25%), 2nd colloquium - learning outcomes 4.-6. (25%); 3rd colloquium - learning outcomes 7.-8. (20%); while a student after each colloquium must realize a minimum of 50% of points;
- at the final part of the exam, 30% of the acquired learning outcomes are evaluated (1-8), whereby the student must realize a minimum of 50% of points to pass the final exam;
- final ECTS grade, is defined on the basis of the achieved total% of knowledge, skills and competencies and numerical grade after the final / remedial exam as follows:
  - grade excellent (5) corresponds to grade A in the ECTS scale and a success rate of 90 to 100%,
  - a grade of very good (4) corresponds to a grade of B on the ECTS scale and a success rate of 75 to 89.9%,
  - grade good (3) corresponds to grade C in the ECTS scale and a success rate of 60 to 74.9%,
  - a grade of sufficient (2) corresponds to a grade of D on the ECTS scale and a success rate of 50 to 59.9%,
  - the grade insufficient (1) corresponds to the grade F in the ECTS scale and the success rate from 0 to 49.9%.

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

1. In the figure, instead of the string ?????, it should be stated
   a) arguments; b) results; c) instructions; d) data and instructions (LO #1)



2. The bus bandwidth is expressed in units of measurement
   a) [Hz]; b) [bit / Hz]; c) [bit / sec]; d) [byte / Hz]; (LO #2)
3. By the term sequential memory is meant
   a) ROM memory; b) RAM memory; c) serial memories; d) temporary memories; (LO #3)
4. What will the status flags show if the following code is executed:
   MOV #5, R03
   CMP #7, R03
   a) Z ☐ N ☑ ; b) Z ☑ N ☐ ; c) Z ☐ N ☐ ; d) Z ☑ N ☑ (LO #4)
5. The basic parts of keyboards are:
   a) keys, memory and arithmetic-logic unit;
   b) keys, memory, control unit and arithmetic-logic unit;
   c) keys, key matrix and keyboard controller;
   d) keys, memory, stepper motor and arithmetic-logic unit; (LO # 5)
6. For optical discs, the path drive motor moves the laser at distances of approx.
   a) 1 mm; b) 100 µm; c) 10 µm; d) 1 µm (LO# 6)
7. In the figure, instead of the string ?????, it should be stated
   a) regulating layers; b) voltage; c) light; d) polarizing filters; (LO # 7)



8. The piezo-electric InkJet technology is possible to eject more than
   a) 20 drops of ink per second;
   b) 200 drops of ink per second;
   c) 2,000 drops of ink per second;
   d) 20,000 drops of ink per second; (LO # 8)

1.10. Main Reading

- Ribarić, S. (2011.). Građa računala: arhitektura i organizacija računarskih sustava, Sveučilište u Zagrebu, Algebra, Zagreb, Hrvatska (in Croatian)
- Smiljanić, G. (1992.). Mikroračunala, Školska knjiga, Zagreb, Hrvatska (in Croatian)

1.11. Recommended Reading

- Mueller, S. (1998.). Upgrading and repairing PCs , 22 izdanje, QUE Corporation, Indiana, USA
- Minesi, M. (2004). The Complete PC Upgrade and Maintenance Guide, Sybex inc., Alameda, USA
- Žagar, M., Kovač, M., Basch, D. (1993.). Uvod u mikroračunala, Školska knjiga, Zagreb, Hrvatska (in Croatian)

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
• Ribarić, S. (2011.). Građa računala: arhitektura i organizacija računarskih sustava, Sveučilište u Zagrebu, Algebra, Zagreb, Hrvatska (in Croatian)	10	50

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1.13. Quality Assurance
The quality of study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of the exams is made annually and a student survey is conducted once a semester.

[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	Jasmin Ćelić, PhD	
Course	On-board training	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
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 course is to direct students to professional work and teamwork on board to meet the required the minimum requirements necessary for practical training in the duties, duties and responsibilities of officers for electrical engineering according to the STCW Convention of 2010 Table-III / 6.

1.2. Prerequisites for Course Registration

/

1.3. Expected Learning Outcomes

It is expected that after completing the coursework, students can:

1. Describe and interpret the general knowledge of the duties of individual crew members.
2. Know duties as a ship electrician.
3. Develop the ability to perform work tasks safely.
4. Explain how to maintain, operate electrical, electronic and control systems on the ship.
5. Know the functional properties, technological conditions and way of operation and maintenance of fire extinguishing agents and lifeboats on the ship.
6. Develop the ability to analyze, the ability to learn through team and individual work, and the ability to manage information and their presentation.

1.4. Course Outline

Introduction to navigation practice.
Get to know life on a ship.
Obligations of individual crew members.
Use of technical documentation.
Familiarity with safety measures related to personnel and the ship, emergency procedures using rescue equipment, firefighting equipment and practical provision of medical first aid on board.
Duties of an Electrical Engineering Officer under the STCW Convention.

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

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1.6. Comments	

1.7. Student Obligations

Attend classes and fulfil all responsibilities on time.
Actively participate in classes.
Access the knowledge test.

1.8. Assessment[1] of Learning Outcomes

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

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

On-board training 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 - the leader of the sailing practice. Assessment and evaluation of students' work is done on the basis of their efforts on board. Students work in teams, and must communicate with each other and exchange knowledge with other groups and try to solve individual problems together.
The course is evaluated with P - Passed or N - Failed

1.10. Main Reading

1. Ordinance on titles and certificates of competence of seafarers. Ministry of Maritime Affairs, transport and infrastructure: 10/28/2013, ELI: / Eli / official / 2013/130/2834.
2. STCW Regulations for the Training, Certification and Watchkeeping of Seafarers, Resolution 2. STCW States Parties to the 1995 Convention
3. International Convention on Standards for Training, Certification and Watchkeeping of Seafarers, London, July 1978, NN - Int. contracts 1/92
4. Pazanin, A.: Marine Engines, Palga, Split, 1998.
5. Ozretic, V.: Naval Auxiliary Machines and Devices, SSM, Split, 2003.

1.11. Recommended Reading

1. Marine Electrical Knowledge, Antwerp Maritime Academy Navale Engineering; Author: Willem Maes, February 19, 2013.
2. Ship's Electro-Technology: Part ;. For Marine Engineers and Electrical Officers; Marine Insight .; Publication date: Oct '2013.
3. International Convention for the Safety of Life at Sea, 1974 (SOLAS 74).

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
	Web	33

1.13. Quality Assurance

The method of monitoring the quality of the program is governed by mechanisms which are developed and applied at the institution level (in accordance with ISO 9001 at the Faculty of Maritime Studies.).

[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 and Health Education 1		
Study Programme	Marine Electronic Engineering and Information Technology		
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

Upon completion of 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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3.2. Course description

Generic information			
Head of Course	Maja Skendžić, mag.cin.		
Course	Physical and Health Education 2		
Study Programme	Marine Electronic Engineering and Information Technology		
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

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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3.2. Course description

Generic information		
Head of Course	Maja Skendžić, mag.cin.	
Course	Physical and Health Education 3	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
Year of Study	2	
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 goal is to acquaint students with the importance of maintaining the health of seafarers through regular physical exercise**,** including fundamental, general, and specific motor skills such as rope climbing, using ship ladders, life-saving techniques, swimming, and rowing.
Through appropriate kinesiology activities, the course aims to meet students' need for physical movement as a means of fulfilling general needs that enhance their adaptive and creative abilities in the context of modern life and academic demands.

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

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

1. Improve their mental and physical health
2. Maintain their health status through regular physical exercise
3. Lead a physically active lifestyle
4. Promote the values of an active and healthy way of life

1.4. Course Outline

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Personal Exercise Program for Seafarers During Voyages (2-, 4-, 6-, and 8-month programs). Maintaining seafarers' health through regular physical exercise. Measuring heart rate at rest, after exertion (running), and during recovery (2 minutes after running). Elective activity: O, K, N (M/F). Flight phase, take-off, and landing during running on board, including potential accidents. Running to the muster station. Climbing up and down ropes and ship ladders. Work, fatigue, and rest cycles.
General and specific physical preparation of seafarers. Explosive strength and reaction speed during onboard emergencies. Low, medium and high ball rebounds in volleyball stance (O). Lifting loads. Typical correct and incorrect movements. Breathing exercises: chest breathing and abdominal breathing. Developing kinesthetic awareness when handling the ball (O, K, N). Importance and application of warm-up, stretching, and relaxation exercises in daily physical activities. Development of general motor skills (static, explosive, and repetitive strength). *Field work. Court coverage during service execution and reception (O). Flexibility and body balance. Precision. Movement speed in seafarers. Stretching, dance structures – F. Ball reception and passing, teamwork in attack (N, K) – M. Assessment of individual student status (course completed or not), based on attendance and active participation in class activities. Elective kinesiology activity (O, K, N).

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 seminar paper is written by part-time students. Field lessons 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 2*.
During the course, students' motor activities are positively evaluated.
Attendance and participation are accurately recorded during each class in a dedicated semester-long *Physical and Health Education Attendance Sheet*.
The course completion is recorded in the ISVU system as "PASSED" for the respective semester.

1.10. Main Reading

1.11. Recommended Reading

1 .Redžić A., Redžić M.: Dodatak kineziološkim znanjima studenata pomoraca u ponudama on-line tehnologija za poticanje tjelesnog vježbanja pomoraca za vrijeme plovidbe. HKS 27. Ljetna škola Kineziologa RH. Poreč 2018.
2. Volčanšek B.: Bit plivanja , Kineziološki fakultet Sveučilišta u Zagrebu, Zagreb, 2002.
3. Conner D., Levitt M.: Naučite jedriti, Gandalf, Zagreb, 2001.
4. Graver D.K.: Scuba diving, Human Kinetics Publisher, Algoritam, Zagreb, 1993.
5. Anderson B.: Stretching, Vježbe istezanja za svakodnevni fitness: trčanje, plivanje, tenis, biciklizam, skijanje, košarka, nogomet i ostale sportove, Gopal, d.o.o., Zagreb, 1997.
6. Anderson B., Burke E., Pearl B.: Fitnes za sve, Gopal, d.o.o., Zagreb, 1997.
7. Janković V. , N. Marelić.: Odbojka, Fakultet za fizičku kulturu Sveučilišta u Zagrebu, Zagreb 1995.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

1.13. Quality Assurance

The quality of studies is monitored in accordance with the ISO 9001 system and European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, pass rate results are analyzed, and appropriate measures are taken. During every class, each student's attendance and participation are accurately recorded on a special EININS Physical and Health Education sheet, which contains longitudinal data tracking general and specific psychomotor skills, knowledge, achievements, and functional abilities. The Physical and Health Education course is evaluated for the respective semester by entering "PASSED" into the ISVU system.

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3.2. Course description

Generic information			
Head of Course	Maja Skendžić, mag.cin.		
Course	Physical and Health Education 4		
Study Programme	Marine Electronic Engineering and Information Technology		
Type of Course	Elective		
Year of Study	2		
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

To familiarize students with the importance of continuously maintaining the health of seafarers through physical exercise, including fundamental, general, and specific motor skills such as rope climbing, using ship ladders, lifesaving techniques, swimming, and rowing. Through appropriate kinesiology activities, the course aims to satisfy students' need for movement as an expression of fulfilling general needs that enhance adaptive and creative abilities in the context of modern life and academic study. *Additionally, the objective of the Physical and Health Education course is to provide students with basic knowledge about health and work-related capacities essential for life.*

1.2. Prerequisites for Course Registration

1.3. Expected Learning Outcomes

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

1. Achieve better mental and physical health
2. Maintain their health status through regular exercise
3. Lead a physically active lifestyle
4. Promote the values of an active and healthy way of life

1.4. Course Outline

Assessment and testing of motor skills and functional abilities of the body. Running technique (short distances), cyclic movement at different tempos up to 6 minutes. Technique of volleyball elements. Volleyball tactics. Technique of basketball elements. Basketball tactics. Kinesiotherapy exercises for spinal health preservation. Spike – attacking element; block – defensive element (O). Stretching, loosenin, and relaxation exercises. Net play, setter in front (O). Jump rope exercises in place and in motion. Service (underhand and overhand) (O). Static strength of seafarers. Measurement and evaluation of motor skills and functional abilities of the body. *Field work. Elements of attack and defense (O). Basic dance structures: English waltz, Viennese waltz – F. Exercises on Swedish ladders (M). Assessment of individual student status (course attended or not), based on attendance and participation or non-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	The seminar paper is written by part-time students. Field lessons 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 2*.
During the course, students' motor activities are positively evaluated. Attendance and participation are accurately recorded during each class in a dedicated semester-long *Physical and Health Education Attendance Sheet*. The course completion is recorded in the ISVU system as "PASSED" for the respective semester.

1.10. Main Reading

1.11. Recommended Reading

1.Redžić A., Redžić M.: Dodatak kineziološkim znanjima studenata pomoraca u ponudama on-line tehnologija za poticanje tjelesnog vježbanja pomoraca za vrijeme plovidbe. HKS 27. Ljetna škola Kineziologa RH. Poreč 2018.
2. Volčanšek B.: Bit plivanja , Kineziološki fakultet Sveučilišta u Zagrebu, Zagreb, 2002.
3. Conner D., Levitt M.: Naučite jedriti, Gandalf, Zagreb, 2001.
4. Graver D.K.: Scuba diving, Human Kinetics Publisher, Algoritam, Zagreb, 1993.
5. Anderson B.: Stretching, Vježbe istezanja za svakodnevni fitness: trčanje, plivanje, tenis, biciklizam, skijanje, košarka, nogomet i ostale sportove, Gopal, d.o.o., Zagreb, 1997.
6. Anderson B., Burke E., Pearl B.: Fitnes za sve, Gopal, d.o.o., Zagreb, 1997.
7. Janković V. , N. Marelić.: Odbojka, Fakultet za fizičku kulturu Sveučilišta u Zagrebu, Zagreb 1995.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*

1.13. Quality Assurance

The quality of studies is monitored in accordance with the ISO 9001 system and European standards and guidelines for quality assurance, implemented at the Faculty of Maritime Studies in Rijeka. Once a year, pass rate results are analyzed, and appropriate measures are taken. During every class, each student's attendance and participation are accurately recorded on a special EININS Physical and Health Education sheet, which contains longitudinal data tracking general and specific psychomotor skills, knowledge, achievements, and functional abilities. The Physical and Health Education course is evaluated for the respective semester by entering "PASSED" into the ISVU system.

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General information		
Course holder	Ph.D.,Jasminka Bonato	
Course	Physics	
Study program	Marine Electronic Engineering and Information Technology	
Course status	mandatory	
Year	1. undergraduate degree	
Score value and method of teaching	ECTS credits	5
	Number of hours (L+E+S)	30+15+0 (2+1+0)

1. DESCRIPTION OF THE SUBJECT

1.1. Course objectives

1. to investigate physical laws from classical and quantum physics necessary for the problems of the profession,
2. apply physical laws in solving tasks

1.2. Course enrollment requirements

-

1.3. Expected learning outcomes for the course

1. Distinguish different coordinate systems and know how to choose the optimal one for a certain physical problem.
2. Explain the harmonic oscillator.
3. Analyze the properties of a mechanical wave.
4. Determine the main characteristics of electromagnetic waves (EMV).
5. Explain the change in wave frequency using the Doppler effect.
6. Apply the laws of geometric and physical optics in the profession and mathematically describe phenomena from both fields.
7. Explain the concepts of duality and uncertainty of measurement in physics.

1.4. Course content

Introduction. Subject and division of physics. Physical quantities and SI units. Newton's laws. Fundamentals of differential and integral calculus. Particle kinematics: material point, velocity, acceleration. Particle dynamics: mass and force, Newton's laws. Vibration: spring and pendulum, the law of conservation of energy. Vibration energy. Muffled and forced vibration. Addition of vibrations. Waves. Wave speed. Harmonic wave. Adding waves. Wave reflection. Sound: loudness, volume. Doppler effect. Electromagnetic vibrations: LC and RLC oscillation circuit, ELM wave equation. Physical optics: interference, deflection, polarization. Geometric optics: Fermat's principle and laws of geometric optics. Total reflection Waves and particles: photons, duality, Heisenberg's uncertainty principle. Matter structure: Bohr model of atoms. Quantum numbers. Multi-atom system: Pauli's principle. Energy bands in crystals. Elements of nuclear physics: radioactivity, ionizing radiation. Interaction of radiation and matter: photoelectric effect, Compton effect.

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

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1.7. Student obligations

Regular class attendance, taking colloquia, completing homework, as well as independent assignments through the merlin system, which students qualify for the final exam.

1.8. Monitoring student work

Class attendance	2	Teaching activity (homework)	0,5	Seminar paper	0,5	Experimental work	
Written exam		Oral exam		Essay		Research	
Projekt		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 + seminar + dz) and final exam 30%.

Examples of evaluating learning outcomes in relation to set outcomes:

Outcomes 1,2 ,3

1.An airplane is flying straight north at a speed of 320 kmh^{-1} relative to the air. The wind is blowing from east to west at a speed of 68 kmh-1. What is the resultant velocity of the airplane in magnitude and direction? How long will it take it to reach a city 200 km away?
2. The amplitude of a harmonic oscillation of a material point is 5 cm, the period of one oscillation is 2 s, and the initial phase is $\pi/4$. Write the equation of this oscillation and find the elongation for t = 1 s.

Outcomes 4,5,6

1. A police car siren emits a sound with a frequency of 1800 Hz. What frequency does a calm listener hear when the car is approaching him, and what frequency does he hear when the car is moving away from him at a speed of 30 m s-1?
2. The spectrum of electromagnetic waves

Outcomes 7

Explain what is the experimental evidence of De Broglie's theory and state its area of application.

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

1. Notes from lectures and exercises
2. J. Dobrinić, J. Bonato: Physics, Faculty of Maritime Studie, Rijeka, 2009.
3. J. Dobrinić, L. Mandić: Physics 1, Faculty of Engineering, Rijeka, 2002.
4. Jasminka Bonato, Julijan Dobrinić, A collection of selected solved examples from physics,Rijeka, 2001. : Maritime high school Rijeka, 2001..
5. J. Dobrinić, L. Mandić: A collection of selected solved examples from physics 1, Faculty of Engineering, Rijeka, 2001.
6. N. Glavan, L. Mandić, J. Dobrinić: A collection of selected solved examples from physics II, Faculty of Engineering, Rijeka, 2004.

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

1. P. Kulišić: Mechanics and heat, Schoolbook , Zagreb, 1998.
2. V. Henč-Bartolić, P. Kulišić: Waves and optics , Schoolbook, Zagreb, 1998.
3. J. Dobrinić: Fizika (waves, optics, structure of matter), Faculty of Engineering , Rijeka, 1998.

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
J. Dobrinić, J. Bonato: Physics, Faculty of Maritime Studie, Rijeka, 2009.	5	61
Jasminka Bonato, Julijan Dobrinić, A collection of selected solved	14	61

examples from physics,Rijeka, 2001. : Maritime high school Rijeka, 2001..		
N. Glavan, L. Mandić, J. Dobrinić: A collection of selected solved examples from physics II, Faculty of Engineering, Rijeka, 2004.	5	61
J. Dobrinić, L. Mandić: Physics 1, Faculty of Engineering, Rijeka, 2002.	3	61

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	**Ivan Panic, PhD**	
Course	**Power electronics**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Compulsory**	
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 enable students to acquire fundamental knowledge and understanding of the key principles of power electronics, in accordance with the requirements of STCW and IMO.

1.2. Prerequisites for Course Registration

Completed courses: Electronic Devices and Circuits

1.3. Expected Learning Outcomes

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

1. List and describe the application areas of power electronics on marine vessels.
2. Explain the operation and classify types of semiconductor switches used in power electronic circuits, and describe control methods and the implementation of protection circuits.
3. Analyze the operation and describe the construction of single-phase and three-phase diode and thyristor rectifiers, and identify their applications on board.
4. Distinguish basic topologies and explain the operation of DC-DC power converters.
5. Explain the operation of current-source and voltage-source inverters.
6. Distinguish and explain the operation and construction of basic isolated switched-mode power supply topologies.
7. Describe the design and characteristics of resonant switches and resonant converters.
8. Interpret the impact of power electronic circuits on the power quality of the shipboard electrical power grid.

1.4. Course Outline

Historical development and significance of power electronics. Applications of power electronics on marine vessels. Types of electronic switches. Protection circuits for electronic switches. Single-phase and three-phase rectifiers. DC-DC converters. Inverters. Resonant circuits and converters. Isolated switched-mode power supplies. Active filters. Power quality and the impact of power electronic devices on shipboard electrical power 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 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] **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 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 learning outcome assessment in relation to learning outcomes 1–8:

1. List the application areas of power electronic circuits on a ship. (Learning outcome 1)
2. Sketch and explain the protection of a transistor from reverse voltage using an antiparallel diode. (Learning outcome 2)
3. Calculate the average output voltage and voltage ripple of a full-wave rectifier with a resistive load and a filter capacitor. (Learning outcome 3)
4. Determine the current through the Zener diode in a parallel voltage regulator given the values of load resistance, Zener power dissipation, input voltage, and output voltage. (Learning outcome 4)
5. Determine the load current of a single-phase voltage-source inverter in a bridge configuration with a resistive-inductive load, given the load parameters, switching frequency, and input voltage. (Learning outcome 5)
6. Sketch voltage and current waveforms of an isolated converter. Explain the characteristic shape of the current through the magnetizing inductance. (Learning outcome 6)
7. List and explain the basic and common characteristics of resonant converters. (Learning outcome 7)
8. Determine the values of the first 11 voltage harmonics and total harmonic distortion (THD) based on known voltage measurements in the frequency domain. (Learning outcome 8)

1.10. Main Reading

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

1.11. Recommended Reading

1. Brodić, T.; Osnove energetske elektronike, Zigo-Rijeka, 2005.
2. Kassakian, J.G., Schlecht M.F., Verghese G.C.; Osnove učinske elektronike, Graphis, 2010.
3. Rashid, M.H.; Power electronics handbook 5th ed., Butterworth-Heinemann, 2024.
4. Rashid, M.H.; Power electronics: devices, circuits, and applications, Pearson, cop. 2014.
5. Patel, M. R.; Shipboard Propulsion, Power Electronics, and Ocean Energy. CRC Press, 2012.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the e-learning platform Merlin	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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Course description

Generic information			
Head of Course	**Vlado Frančić, Full Professor, Ph.D.**		
Course	**Safety and Quality Management in Shipping**		
Study Programme	**Marine Electronic Engineering and Information Technology**		
Type of Course	**Mandatory**		
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)		**30 + 15 + 0 (2 + 1 + 0)**

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The aim of the course is to familiarize students with the principles of quality, in general, as well as with the principles of safety management systems in shipping. The basic of safety management in shipping is an International Safety Management Code (ISM Code). Students will be familiar with the requirements in accordance with the ISM Code and the application onboard and generally in shipping. In addition, students will be introduced to practical examples of the application of the safety management system on board. Also, the objective of the course is to give students knowledge for maintaining and improving the general or dedicated safety management system on ship and in the shipping companies by the proper implementation of the provisions of the ISM Code.

1.2. Prerequisites for Course Registration

The prerequisite for enrolling in the course is having attended the course "Safety at Sea," and the prerequisite for passing the course is having passed the course "Safety at Sea."

1.3. Expected Learning Outcomes

It is expected that the student will be able to:

1. Formulate the concept of quality.
2. Formulate and interpret the standardization of quality systems.
3. Present the specific characteristics of the development of safety management systems in maritime transport.
4. Present the implementation of the ISM Code in maritime transport.
5. Synthesize the obligations of shipowners and their employees and seafarers regarding the implementation of the ISM system.
6. Demonstrate the method for assessing the quality system, i.e., the ISM system on board and within the company.

1.4. Course Outline

Introduction, the concept of quality. What is quality? Historical development of the quality system. Process of establishing a quality system. Quality standardization (ISO standards). Maritime safety and environmental management system - concepts, regulations. Basic principles of safety management in shipping. International Safety Management System - ISM Code - concepts, division, general principles and objectives, application. Safety Management System (SMS). The responsibility and authority of the company and the master responsibility and authority. Developing plans for essential shipboard operations and critical situations. Certification, evaluation and control. Amendments to the ISM Code. Risk assessment and risk management as per of ISM requirements.

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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	Exercises includes practical work with ship documentation required by the ISM codes (check list, work permit, ...)	

1.7. Student Obligations

Active participation in classes (lectures and exercises) and at least 70% attendance. Completed individual assignments. Oral exam.

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation	0,5	Seminar paper		Experiment	
Written exam		Oral exam	1,0	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

Student obligations are: regular attendance of classes and completion of homework assignments on assigned topics in the field of ISM Code application on board. Part-time students must prepare a seminar paper on an assigned topic.
The prerequisite for taking the final exam is the completion of exercises and homework assignments (individual tasks – application of the ISM Code; solving problem tasks in groups and individually).
The final exam (oral exam) assesses the comprehensiveness of theoretical knowledge in the field of quality and safety management in maritime transport (ISM Code). A minimum of 50% of the required theoretical knowledge must be achieved.
Examples of evaluating learning outcomes in relation to preset learning outcomes are:

1. Explain the importance of the Master's overriding authority and responsibility in accordance with ISM Code (Learning outcomes 4 & 5).
2. Enlist essential shipboard operations and explain the obligations of the company in accordance with ISM regulations (Learning outcomes 5).
3. Prepare risk assessment example (Learning outcomes 3, 4 & 5).

1.10. Main Reading

1. Teaching materials on the e-learning system – Merlin (https://moodle.srce.hr)
2. ISM Code, International Safety Management Code with guidelines for its implementation, London IMO, 2018 Edition.
3. Technical Rules, Croatian Register of Shipping, Safety Management System – Part 30, 2010 Edition.
4. Lazibat Tonći: Quality Management (in Croatian) – M.E.P., 2009.

1.11. Recommended Reading

1. Guidelines on The Application Of The IMO International Safety Management (ISM) Code, International Chamber of Shipping (ICS), 2024.
2. International safety Management Code, IMO Res A.741(18) with amendments (ISM Code), IMO, London.
3. Revised Guidelines on the Implementation of the International Safety Management (ISM) Code - IMO Resolution A.1118(30).
4. Technical rules for statutory certification of the Croatian Register of Shipping, CRS, Split.
5. ANDERSON, P. / WRIGHT, J. / NICHOLLS, S./ NOONAN, S. - Cracking the Code: The relevance of the

[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.

ISM Code and its impact on shipping practices. London, Nautical Institute, 2003. (ISBN 1- 8700 – 77 – 63 - 6).
6. ANDERSON, P. - ISM Code: A practical guide to the legal and insurance implications. 2nd ed. London.
7. Kondić Živko, Quality and ISO 9000 (in Croatian) – TIVA, Varaždin, 2002.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
1-3	Elektronsko izdanje	25
4	2	25

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. An analysis of exam pass rates is conducted annually, and a student survey is carried out once per semester. For this course, all relevant data and information are available to all students via the course instructors' website/e-learning platform.

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3.2. Course description

Generic information		
Head of Course	Lovro Maglić, Ph.D.	
Course	Safety at sea	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
Year of Study	1	
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

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	2	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	**Igor Rudan, PhD**	
Course	**Ship design and construction**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Level	University undergraduate study program	
Type of Course	Mandatory	
Year of Study	1.	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	3
	Number of Hours (L+E+S)	30+15+0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to acquaint students with the basic ship's dimensions and measures, transversal and longitudinal constructional elements, elementary conception of ship's strength, constructional features of different types of ships and basic knowledge of ship's stability.

1.2. Prerequisites for Course Registration

No prerequisites

1.3. Expected Learning Outcomes

It is expected that the student will be able to:

1. Describe the historical development of ships and interpret international regulations related to ship construction.
2. Interpret and describe the methods and types of ship construction, classify the elements of longitudinal and transverse strength, and identify the main structural components of a ship.
3. Categorize the principal dimensions and measurements of a ship, and deconstruct ship mooring and anchoring systems as well as cargo handling systems.
4. Deconstruct and analyze the technical and technological characteristics of various ship types (e.g., liquid bulk carriers, dry bulk carriers, container ships, general cargo ships, passenger ships, special-purpose vessels, etc.).
5. Interpret and describe the classification of ship stability according to different criteria.

1.4. Course Outline

International rules for ship construction and historical development. Construction materials, welding, bulkheads, watertight bulkhead, watertight door. Structural elements of longitudinal and transversal ship's strength. Strength and stress of ship structure. Ship compartments, cargo compartments, navigational bridge and engine room. Ship's cargo handling equipment for different types of ships. Ship's operational equipment. Rudder types and their characteristics. Ship propulsors types and their characteristics, alternative designs of propulsors and rudders. Ship's geometric features, dimensions and measures. Ship drawings and designs. General arrangements and plans of different ship technologies. Windage and underwater areas. Ship's division according purpose, type of cargo, navigational 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 liner and cruise ships, and offshore vessels with different purposes and services. Ship stability definition and division. Basic ship hydrostatics. Initial transverse metacentric height. Transverse stability changes after vertical and horizontal mass shifting. Ship stability change after mass transhipment (loading/unloading). Influence of Free Surface Correction (FSC) on transverse stability. Basic of ship longitudinal stability.

1.5. Modes of Instruction	☒ 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

Active attendance at classes. At least 70% of course attendance.
Passed two written exams. Final oral exams. .

1.8. Assessment[1] of Learning Outcomes

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

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

70 % of the course grade is based through 2 written exams in class and 30 % of the course grade is based in 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.
Continuous assessment: Each written exam must have at least 60 % score.
Final oral exam (learning outcomes 1- 8 – 30% of curse grade) checks the competences of theoretical knowledge where it is necessary to achieve a minimum of 50 % of the required theoretical knowledge.
Examples of learning outcome assessments in relation to the defined learning outcomes:

1. Describe the historical development of the double hull system.
2. Classify and describe the transverse structural elements that support the ship's deck.
3. Explain the concept of ship draft and illustrate a draft belt ranging between 8 and 10 meters.
4. Identify and analyze the technical and technological characteristics of container ships and compare them with those of general cargo ships.
5. Examine and represent ship stability in relation to the axes about which it acts.

1.10. Main Reading

1. Rudan, I., teaching materials from the course Ship design and construction on the teacher's personal web site (MERLIN) of the Faculty of Maritime Studies in Rijeka
2. Ocean Technologies Group – Ocean Learning Platform (OLP); training solutions
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.

[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.

6. Buljan, I., Stabilnost brodova, Priručnik za pomorce, Školska knjiga Zagreb, Zagreb, 1982.
7. Milošević, M., i Š., Osnove teorije broda 1, Sveučilište u Zagrebu, Zagreb, 1981.
8. Vademecum Maritimus, Podsjetnik pomorcima, Pomorski fakultet u Rijeci, Rijeka, 2002.

1.11. Recommended Reading

1. Wärtsilä Encyclopedia of Ship Technology; Jan Babicz; Wärtsilä Corporation, 2015.
2. Eyres, D. J., Ship Construction, Butterworth-Heinemann, London, 2007
3. K.J. Rawson, E.C. Tupper, Basic Ship Theory, Longman Scientific & Technical, Essex, 1984.
4. Biblioteka pomorskog časnika, sv. 1, sv. 2, sv. 3, sv. 4
5. Biblioteka Sigurnost na moru
6. Jovanović, Filip; Rudan, Igor; Žuškin, Srđan; Sumner, Matthew Comparative analysis of natural gas imports by pipelines and FSRU terminals. // Pomorstvo, 33 (2019), 1; 110-116 doi:10.31217/p.33.1.12
7. Sumner, Matthew; Rudan, Igor A Hybrid MCDM Approach to Transshipment Port Selection. // Pomorstvo, 32 (2018), 2; 258-267 doi:10.31217/p.32.2.11
8. Ivče, Renato; Rudan Igor; Rudan Mateo: Management and Usage of Nitrogen Systems on Liquefied Natural Gas (LNG) Carriers.// Pomorski zbornik, 55(2018), 219-227
9. Ivče, Renato; Jurdana, Irena; Rudan, Igor: Doprinos učinkovitosti Ro-Ro putničkog prometa primjenom usluga pokretne telekomunikacijske mreže na području Primorsko-goranske županije. // Pomorstvo : journal of maritime studies, 25 (2011), 2; 445-460
10. Vuskovic, B.; Rudan, I.;Sumner, M. Fostering Sustainable LNG Bunkering Operations: Development of Regulatory Framework. Sustainability 2023, 15, 7358. https://doi.org/10.3390/su15097358
11. Sirotic, M.; Žuškin, S.; Rudan, I.; Stocchetti, A. Methodology for the Sustainable Development of the Italy-Croatia Cross-Border Area: Sustainable and Multimodal/Cross-Border Passenger Services. Sustainability 2021, 13, 11895. https://doi.org/10.3390/su132111895
12. Dan Martinčević,, Igor Rudan, Davor Šakan; The Panama Canal drought crisis and its impact on the tanker market; Book of Abstracts, 8th My First Conference, 19 September 2024, Rijeka
13. Leopold Mandić, Alen Jugović, Josip Orović, Igor Rudan; Analysis of port infrastructure on the Croatian coast of Adriatic sea for berthing ships powered by alternative fuels; 3rd International Conference of Maritime Science & Technology; Dubrovnik, 14 – 16 September 2023
14. 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

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials from the course Ship design and construction	MERLIN – online	55
Ocean Technologies Group – Ocean Learning Platform (OLP); training solutions	-	
Brodovi multimodalne prijevozne tehnologije	10	
Ro-Ro brodovi	10	
Tankeri	10	
Osnove teorije broda 1 i 2	5	

Brodovi multimodalne prijevozne tehnologije	10	

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 analysed and appropriate measures are adopted.

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3.2. Course description

Generic information		
Head of Course	**Ivan Panic, PhD**	
Course	**Ship electric propulsion**	
Study Programme	**Marine Electronic Engineering and Information Technology**	
Type of Course	**Compulsory**	
Year of Study	**3.**	
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 objective of this course is to enable students to understand ship electric propulsion systems and their impact on the ship's electrical power network, as well as the underlying reasons for the use of high voltage on board, through the application of knowledge related to the technical and safety aspects of the ship's high-voltage electrical power system.

1.2. Prerequisites for Course Registration

Completed courses: Electronic Devices and Circuits

1.3. Expected Learning Outcomes

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

1. List and explain the operational advantages of electric propulsion and assess their significance.
2. Analyze the electric power generation system on vessels equipped with electric propulsion.
3. Explain the importance and functionality of propulsion transformers and transformer connection group configurations.
4. Explain the functionality and evaluation system of electric motor drives within ship electric propulsion systems.
5. Describe the operation and analyze the design of propulsion frequency converters, including cycloconverters, synchro-converters, and pulse-width modulation converters.
6. Analyze current and voltage harmonic distortions in the electric power network of vessels with electric propulsion.
7. Explain the reasons for the use of high voltage on board, identify hazards related to high-voltage operation, and demonstrate the application of safety measures.
8. Interpret classification society rules regarding electric propulsion and high voltage, and demonstrate their application.

1.4. Course Outline

Historical development and concepts of electric propulsion. Key characteristics and advantages compared to traditional propulsion systems. Operational benefits of electric propulsion. Basic components and operating principles of electric motor drives. Marine propulsion devices. Types of electric motors used in ship electric propulsion. Performance evaluation of electric motor drives in ship electric propulsion. Concepts and functionality of frequency converters. Role and importance of transformers in electric propulsion systems. Reasons for the application of high voltage in modern ship systems. Safety measures when working with high voltage. Potential hazards and procedures for their mitigation. Key standards and regulations related to the application of high voltage in ship electric propulsion 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 class attendance, continuous assessment, final exam.

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	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

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 learning outcome assessment in relation to learning outcomes 1–8:

1. Draw the power balance of a fully integrated ship electric propulsion system. Indicate the energy conversion steps and list the assumed losses. (Learning outcome 1)
2. Sketch a hybrid topology of a conventional high-voltage shipboard power system incorporating battery-based power sources. (Learning outcome 2)
3. What is the K-factor of a transformer? (Learning outcome 3)
4. List the advantages of asynchronous electric motors in ship electric propulsion systems. (Learning outcome 4)
5. Why do thyristors, despite their clear disadvantages, still form the basis of semiconductor switching equipment in ship propulsion frequency converters? (Learning outcome 5)
6. How do multi-pulse configurations of ship propulsion rectifiers reduce the current ripple in propulsion motors? (Learning outcome 6)
7. Name at least four types of electrical protection used for high-voltage propulsion motors. (Learning outcome 7)
8. Compare the implementation of protective relays in shipboard high-voltage and low-voltage systems. Explain the differences in technological design. (Learning outcome 8)

1.10. Main Reading

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

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1.11. Recommended Reading

1. Patel, Mukund R.; Shipboard electrical power systems. Crc Press, 2021.
2. Patel, Mukund R.; Shipboard Propulsion, Power Electronics, and Ocean Energy, Crc Press, 2012.
3. Stefan Kopatsch S., Kopatsch G.; ABB switchgear manual 13th ed., Hitachi ABB Power Grids, 2020.
4. Hall, Dennis T. Practical marine electrical knowledge. Witherby Seamanship International,2014.
5. Vlahinić I., Električni sistemi plovnih objekata, 1988.

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Teaching materials available on the e-learning platform Merlin	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	PhD Mirano Hess	
Course	Ship organization and management	
Study Programme	Marine Electronic Engineering and Information Technology	
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)	45 + 0 + 0

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

To equip students with the understanding and application of procedures for organized teamwork, human resource management, and leadership on board ships in accordance with the latest recommendations and regulations in maritime.

1.2. Prerequisites for Course Registration

/

1.3. Expected Learning Outcomes

After completing the course, students will be able to:

1. Interpret procedures for performing maritime watches.
2. Identify factors influencing the planning and organization of teamwork.
3. Evaluate elements of human resource management on board ships.
4. Distinguish and compare the impact of human and other factors on situational awareness and decision-making processes.
5. Explain the similarities and differences between selected leadership styles.

1.4. Course Outline

1. Organization of duties and distribution of responsibilities among the crew, shipmaster, and navigation watchkeeping.
2. Port watchkeeping, general requirements for ship crews.
3. Human resource management, error chains, analysis, and prevention.
4. Situational awareness.
5. Leadership and work organization, team member relationships.
6. Management and attitude, communication.
7. International and national regulations and recommendations, maritime organizations, and institutions.
8. Emergency preparedness and danger response.
9. Planning work activities.
10. Leadership styles and teamwork, task execution capability, and workload management.
11. Practical knowledge of crew management and training.
12. Knowledge and skills for effective resource management and decision-making methods.
13. Correlation between human factors and maritime accidents, analysis of selected maritime accidents.

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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, I3). Final exam: written exam on course material, minimum 50% of grade points required (I4, I5).
Examples of Learning Outcome Assessments:

1. Interpret what officers must agree on and consider when taking over the bridge watch. (I1)
2. Identify and explain factors the captain must consider when organizing the bridge watch. (I2)
3. Evaluate how certain types of subordination affect team degradation and how to prevent it. (I3)
4. Distinguish indicators of reduced or lost situational awareness and compare ways to maintain awareness. (I4)
5. Explain the characteristics of a leader who follows situational leadership principles. (I5)

1.10. Main Reading

1. Hess, M.: Organizacija rada i upravljanje na brodu, 2025, na Merlinu (https://moodle.srce.hr).

1.11. Recommended Reading

1. Bridge Procedures Guide, ICS, 2022
2. Bridge Team Management: A Practical Guide, Nautical Institute, 2004
3. Pomorski zakonik RH
4. Konvencija STCW 1978/2022
5. Code of Safe Working Practices for Merchant Seamen Consolidated Edition, TSO, 2024
6. Mišković, Darijo ; Ivče, Renato ; Hess, Mirano ; Koboević, Žarko: The Influence of Shipboard Safety Factors on Quality of Safety Supervision: Croatian Seafarer's Attitudes // Journal of marine science and engineering, 10 (9) (2022)
7. Mišković, Darijo ; Ivče, Renato ; Hess, Mirano ; Đurđević-Tomaš, Ivica: The influence of organisational safety resource- related activities and other exploratory variables on seafarers' safety behaviours // Journal of navigation, 75 (2022)
8. Grbić, Luka ; Hess, Mirano: Tanker inspection regime in correlation with maritime accident risks and management decisions // High technologies. Business. Society. Sofija: Scientific technical union of mechanical engineering Industry - 4.0, 2021

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Hess, M.: Organizacija rada i upravljanje na brodu, 2025, na Merlinu (https://moodle.srce.hr).	Unlimited	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 University of Rijeka. Once a year, the results of the transience are analyzed and appropriate measures are adopted.

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General information		
Course holder	Ph.D., Jasminka Bonato	
Course	Technology of electric materials	
Study program	Marine Electronic Engineering and Information Technology	
Course status	mandatory	
Year	1. undergraduate degree	
Score value and method of teaching	ECTS credits	5
	Number of hours (L+E+S)	30+15+0 (2+1+0)

1. DESCRIPTION OF THE SUBJECT

1.1. Course objectives

1. investigate the properties and applications of materials in electrical engineering
2. interpret materials testing methods

1.2. Course enrollment requirements

-

1.3. Expected learning outcomes for the course

After completing and passing the course, students will be able to:
1. List electrical materials: properties, definitions, applications.
2. Compare basic methods of testing materials.
3. Describe the structure of the atom: Bohr's model of the hydrogen atom.
4. Explain the properties and applications of conductors.
5. List the properties and applications of semiconductors.
6. Interpret the properties and applications of dielectrics.

1.4. Course content

1. Atom, atomic structure, quantum numbers.
2. Periodic table. Atomic bonds. Electron band theory.
3. Basics of crystal structure. Major crystal structures. Irregularities in crystal structure.
4. Methods of testing materials
5. Conductors
6. Semiconductors
7. Dielectrics

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

1.7. Student obligations

Regular attendance at classes, taking midterm exams, and completing homework assignments qualify students for the final exam.

1.8. Monitoring student work

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

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

During classes 70% (colloquia + seminar + dz) and final exam 30%.
Examples of evaluating learning outcomes in relation to the set outcomes:

Outcome:1

If the principal quantum number n = 4, this corresponds to the shell_____. The largest number of electrons is _____, according to the formula:_____.

Outcome:5

Which metals have an FCC structure? What are their properties?

Outcome:6

The most important material for making semiconductors is:
a) Si
b) Ge
c) Ga

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

1. Lecture notes
2. Tomac, N.: Technical materials, Rijeka, 2010.

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

1.Kuzmanić, R. Vlašić, I. Vujović, Electrical materials, Maritime College in Split, Split, 2001.
2. Application properties and microscopic analysis of elastomer samples cross-linked by gamma radiation Jasminka Bonato,Scientific Journals of the Maritime University of Szczecin, Zeszyty Naukowe Politechniki Morskiej w Szczecinie - 78 15-21,https://repository.am.szczecin.pl/handle/123456789/2821

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
Tomac, N.: Technical materials, Rijeka, 2010.	5	
Kuzmanić, R. Vlašić, I. Vujović, Electrical materials, Maritime College in Split, Split, 2001.	3	

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	Marko Gulić, PhD	
Course	Web Programming	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Elective	
Year of Study	2nd	
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 provides a fundamental understanding of web application development through practical use of technologies for building websites and applications. Students will learn the basics of structuring, styling, and adding interactivity to web pages, as well as developing applications that include working with databases, migrations, and CRUD operations. The course also covers data validation and the implementation of authentication in web applications.

1.2. Prerequisites for Course Registration

-

1.3. Expected Learning Outcomes

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

1. Structure a basic web page using HTML elements such as headings, paragraphs, and links.
2. Apply basic CSS rules to style and arrange elements within an HTML page.
3. Create an interactive web page using Bootstrap components for responsive and visual design.
4. Understand the structure of a Laravel project and implement basic functionalities.
5. Manage databases with MySQL, including migrations and relationships within Laravel.
6. Implement CRUD operations for data management in a Laravel application.
7. Set up authentication in a Laravel application using Laravel Breeze.

1.4. Course Outline

Introduction to web application development. HTML basics: elements such as headings, paragraphs, and links. CSS and styling: formatting elements, layout, colors, margins, and padding. Bootstrap and interactive components: responsive pages, navigation bars, cards, tables, forms, and carousels. Working with databases: MySQL, SQL queries for inserting, updating, deleting, and retrieving data. Application development using Laravel: MVC architecture, controllers, models, views, routes, and migrations. Authentication and security: Laravel Breeze for implementing authentication and protecting data.

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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	Classes are conducted through a combination of classroom instruction and individual work in the computer laboratory. Upon enrolment in the course, students will be directed to use the online learning platform. A detailed schedule of lectures and exercises will be published in the course implementation plan.	

1.7. Student Obligations

- Regularly attend classes (lectures and exercises) and take short quizzes at the beginning of each exercise session
- Take the 1st and 2nd midterm exams
- Create and present a project assignment
- Take the final (written/oral) exam if the requirements for attendance and assessment have been met

1.8. Assessment[1] of Learning Outcomes

Course attendance	1,5	Class participation		Seminar paper		Experiment	
Written exam		Oral exam	0,5	Essay		Research	
Project	0,5	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 assessment during classes accounts for 70% of the achieved learning outcomes:
  - – Midterm Exam 1 – Learning Outcomes 1–3 (20%)
  - – Midterm Exam 2 – Learning Outcomes 4–7 (20%)
  - – Project assignment – learning outcomes 1–7 (20%)
  - – Quick quizzes during exercises – Learning Outcomes 1–7 (10%)

  In each midterm exam, the student must achieve at least 50% of the total points.

- The final (oral) exam accounts for 30% of the achieved learning outcomes (1-7), and the student must achieve at least 50% of the points on the final exam to pass.

Examples of assessment tasks aligned with learning outcomes:

1. Create an HTML page with a title, paragraphs, and hyperlinks.
2. Style the HTML page using basic CSS layout rules.
3. Develop a responsive web page using Bootstrap components.
4. Set up a Laravel project and implement basic functionality.
5. Create a MySQL database and define migrations in Laravel.
6. Implement CRUD operations for user data in Laravel.

[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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7. Set up user authentication using Laravel Breeze.

1.10. Main Reading

• Shay Howe: Learn To Code Html And Css, Adams Media, 2014., available online https://learn.shayhowe.com/

• Jeffrey Way: Laravel From Scratch, Laracasts, 2025., available online https://laracasts.com/series/laravel-8-from-scratch

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

1.11. Recommended Reading

• • Laravel 8.x Docs, Laravel Holdings Inc., 2025. available online https://laravel.com/docs/8.x

1.12. Number of Main Reading Examples

Title	*Number of examples*	*Number of students*
Shay Howe: Learn To Code Html And Css	unlimited	40
Jeffrey Way: Laravel From Scratch	unlimited	40
E-course teaching materials available on the Merlin e-learning system	unlimited	40

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		
Course	UNDERGRADUATE FINAL THESIS	
Study Programme	Marine Electronic Engineering and Information Technology	
Type of Course	Mandatory	
Year of Study	3rd	
Estimated Student Workload and Methods of Instruction	ECTS coefficient of Student Workload	10
	Number of Hours (L+E+S)	

1. GENERAL COURSE DESCRIPTION

1.1. Course Objectives

The objective of the course is to enable students to independently apply the theoretical and practical knowledge acquired during their studies in the treatment of a selected professional or scientific topic. Students are encouraged to critically analyze domestic and foreign literature, correctly apply research methodology, and structurally compose written work in accordance with academic standards and faculty regulations. Special attention is given to developing the ability to interpret and evaluate relevant data, theoretical approaches, and practical examples. Through the process of consultations with a mentor and a final defense, students acquire competencies to present the results and conclusions of their research before a professional committee, thereby demonstrating academic maturity and the ability to solve complex problems.

1.2. Prerequisites for Course Registration

The student enrolls in the course Final Thesis by registering for the sixth (summer) semester of the undergraduate study program.

1.3. Expected Learning Outcomes

It is expected that the student will be able to:

1. Analyse relevant domestic and foreign literature and identify key insights, viewpoints, and facts related to the research topic.
2. Apply research methodology in the planning, processing, and interpretation of collected data.
3. Synthesize data from various sources and compose a coherent final thesis text that includes illustrations (tables, graphs, diagrams) in accordance with research methodology.
4. Evaluate research results and formulate conclusions that reflect an understanding of the problem and the ability for critical thinking.
5. Present and defend the main results and conclusions of the final thesis before a mentor or professional committee.

1.4. Course Outline

The final thesis is an independent professional or scientific treatment of a selected topic. By completing it, the student demonstrates possession of the necessary competencies and learning outcomes, as well as the ability to apply theoretical and practical knowledge acquired during the studies. In the process of defending the final thesis, the student must demonstrate mastery of relevant scientific and professional knowledge related to the chosen topic. The thesis is written and defended in Croatian, though, exceptionally, it may also be written and defended in English. The oral defence is conducted before the mentor or a Committee for the Defence and Evaluation of the final thesis.

1.5. Modes of Instruction	☐ Lectures	☒ Practical work
	☐ Seminars and workshops	☐ Multimedia and Network

	☐ Exercises ☐ E-learning ☐ Field work	☐ Laboratory ☒ Mentorship ☒ Other (research and collaboration with industry professionals, analysis and processing of practical examples and data, and so forth)
1.6. Comments		

1.7. Student Obligations

The student, in agreement with the mentor, must choose the topic of the final thesis and write it according to the instructions found on the faculty website:
https://www.pfri.uniri.hr/web/hr/dokumenti/Upute.za.izradu.zavrsnog.rada.PFRI.26.3.2024.pdf

As assistance for the student, a template for preparing the final thesis is also available on the faculty pages:
https://www.pfri.uniri.hr/web/hr/dokumenti/Predlozak_za_zavrsni_rad_08.07.2024.docx

The paper must be grammatically, orthographically, and stylistically correct.

After the first consultative meeting between the student and mentor, the student consults the assigned literature, studies the subject matter, consults their own collected sources, and thoroughly develops the content of the thesis.

Once the mentor approves and accepts the final thesis, the student submits the final version to the student office.
The final thesis is written in accordance with the Regulations on the Final Thesis:
https://www.pfri.uniri.hr/web/hr/dokumenti/pravni_akti/Pravilnik.o.zavrsnom.radu.na.sveucilisnom.prijediplomskom.studiju.pdf

1.8. Assessment[1] of Learning Outcomes

Course attendance		Class participation		Seminar paper		Experiment	
Written exam		Oral exam		Essay		Research	3,5
Project		Continuous Assessment		Presentation		Practical work	
Portfolio		Mentorship work	1,5	Final thesis in written form	3,5	Oral defence of the final thesis	1,5

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

Verification of the achievement of learning outcomes is conducted before the mentor or a professional Committee composed of three members, including the mentor. An external associate can be a member of the Committee if the thesis topic requires additional specific knowledge and competencies. The student must defend the thesis with an oral presentation and by answering questions. The Committee evaluates the quality and coverage of the work, clarity and precision of the presentation, the ability to answer professional questions, and the level of mastery of the chosen topic. During the defence, a report is kept in which data about the work, questions posed, and the candidate's success grade are recorded.
The originality of the final thesis is checked using an appropriate IT system, and the mentor, based on the analysis, compiles a report on the conducted check. A positive opinion from the mentor and confirmation of the originality of the work are prerequisites for accepting the work and organizing the defense.

1.10. Mandatory literature (at the time of study program proposal submission)

[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. Mandatory literature from the course for which the final thesis is registered and written
2. Additional literature in agreement with the course instructor – mentor
3. Instructions for writing the final thesis, editors: Prof. Dr. I. Kolanović, Associate Prof. Dr. A. Perić Hadžić, Associate Prof. Dr. I. Jurdana, Assistant Prof. Dr. M. Jardas, University of Rijeka, Faculty of Maritime Studies, Rijeka, 2024 – available at https://www.pfri.uniri.hr/web/hr/dokumenti/Upute.za.izradu.zavrsnog.rada.PFRI.26.3.2024.pdf

1.11. Recommended Reading (at the time of study program proposal submission)

1. Mandatory literature from the course for which the final thesis is registered and written
2. Additional literature in agreement with the course instructor – mentor

1.12. Number of Main Reading Examples

Title	*Reading examples*	*Number of students*

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 student surveys are carried out once per semester. Additionally, pass rate results are analyzed annually, and appropriate measures are taken based on the findings.