University of Rijeka
Faculty of Engineering

CURRICULUM
UNDERGRADUATE UNIVERSITY STUDY OF NAVAL ARCHITECTURE

Rijeka, March 2015

1. CURRICULUM DESCRIPTION

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

1. semester							
	Subject title	Hours / week					ECTS
		L	aT	lT	dT	L+T	
	Mathematics I	3	3			6	7
	Statics	3	1		1	5	6
	Materials I	2	2			4	4
	Electrical Engineering	2	1			3	5
	Computer Applications in Engineering	1		2		3	4
	Engineering Graphics	2			2	4	4
	TOTAL					25	30

L - lectures, aT – auditory tutorials, lT – laboratory tutorials, dT – design tutorials,

2. semester							
	Subject title	Hours / week					ECTS
		L	aT	lT	dT	L+T	
	Mathematics II	3	3			6	7
	Kinematics	2	2		1	5	6
	Strength of Materials	3	2	1		6	7
	Materials II	2		1		3	5
	Modelling by Computer	2			2	4	4
	TOTAL					24	30

3. semester							
	Subject title	Hours / week					ECTS
		L	aT	lT	dT	L+T	
	Dynamics	2	2			4	5
	Fluid Mechanics	3	2			5	5
	Welding Engineering I	2		1		3	4
	Thermodynamics NA	2	2			4	5
	Introduction to Marine Vessels	2	1			3	4
	Basis of Machine Elements Design	2			2	4	4
	English Language I	1	1			2	3
	TOTAL					25	30

4. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Engineering Statistics	2	1	1		4	5
	Ship Hull Forms	2	1		2	5	6
	Basics of Ship Production	2			1	3	5
	Ship Structure I	3			1	4	6
	English Language II	1	1			2	3
	Professional Practice I						5
	TOTAL					18	30

5. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Seaworthiness and Stability of the Ship	3	2		1	6	7
	Ship Equipment	3		1		4	6
	Ship Structure II	1			3	4	6
	Shipbuilding Technology	2		1	1	4	6
	Elective Project [1]				3	3	5
	TOTAL					21	30

[1] election from list of offered projects: Basics of Ship Production, Introduction to Marine Vessels, Seaworthiness and Stability of the Ship, Shipbuilding Technology, Ship Equipment, Ship Hull Forms, Ship Structure I, Ship Structure II.

6. semester							
	Subject title	Hours / week					ECTS
		L	aT	IT	dT	L+T	
	Organization and Economics of Business Systems	2	1			3	4
	Marine Hydrodynamics I	3	2	1		6	8
	Free Elective Subject I[2]	2	1			3	4
	Free Elective Subject II[2]	2	1			3	4
	Final Work						10
	TOTAL					15	30

[2] Enroll one subject, a total of two subjects

Free Elective Subjects I i II							
	Subject title	Hours / week					ECTS
		L	aT	lT	dT	L+T	
	Small Craft Building and Maintenance UN	2	1			3	4
	Technology Processes of Shipbuilding	2	1			3	4
	Basic Ship Dynamics	2	1			3	4
	Marine Auxiliary Machinery	2	1	1		4	4
	Environment Protection	3				3	4
	Quality Assurance	2	1			3	4
	Computer Simulations in Engineering	2			1	3	4
	Introduction into Finite Element Method	2		1		3	4
	Energy Sources	3				3	4
	Processes of Heat Treatment	2		1		3	4
	Automation	2	1			3	4
	Introduction to Modern Physics	2	1			3	4
	System Modelling and Simulation	2		1		3	4
	Physical and Health Education[3]			2		2	1

[3] Subject can be enrolled as additional free elective subject

UNDERGRADUATE UNIVERSITY STUDY OF NAVAL ARCHITECTURE TOTAL	Hours	ECTS
	128	180

Basic description		
Course title	Automation	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Understanding the basic principles of automation and its impact on economic and social development.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Describe the historical development of automation, define the reasons for the introduction of automation and describe the advantages and disadvantages of automation. Define the level of automation and explain the means of automation of manufacturing and service activities. Describe the methods and strategies of automation. Define a methodology for analysis and synthesis of flexible and intelligence systems. Describe the self-organizing system, explain the structure, function, advantages and disadvantages, and describe the evolution of automated devices, machines and systems. Describe case studies of automated devices, machines and systems and define scenarios and strategies of leadership. Describe the current status and development trends of automation and describe barriers to development and forecasting.

1.4. Course content

Historical review of the automatic circuits, devices and machines. Ancient and medieval automata. Five levels of automation: assembly, device, machine, system and plant. Automation of manufacturing and service activities. Modern means of automation of production: digital computers, manipulators, robots. Automation strategy. Leading ideas and methodology of synthesis of flexible and intelligent systems. Artificial Intelligence. Self-organizing and autonomous systems. Economic and social aspects of automation of human activities. Selected examples of modern automated machines and systems. Current scientific research projects. Present status and development trends of automation.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attendance, activities in the classroom, homework and self-study.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam	0.5	Essay		Research	
Project	1	Sustained knowledge check		Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance, activities in the classroom, homework, two control written exam and final oral and written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Nikolić, G.: Pneumatics And Hydraulics: Part 1, Pneumatics, Školske novine, Zagreb, 2010. (in Croatian)

Croser, P., Ebel, F.: Pneumatics, Festo Didactic GmbH & Co. 2002.
B. Katalinic, Industrieroboter und Flexible Systeme für Drehteile, VDI Verlag, Düsseldorf, 1990.
B. Katalinic, Intelligent Manufacturing Systems, skripta, Technische Universität Wien.

1.11. Optional / additional reading (at the time of proposing study programme)

Katalinic, B., Bionic Assembly Systems: Selforganizing Complex Flexible Assembly System, Acta Mechanica Slovaca, Vol. 6, No. 2/2002, pp. 15-20, ISSN: 1335-2393.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Nikolić, G.: Pneumatics And Hydraulics: Part 1, Pneumatics, Školske novine, Zagreb, 2010. (in Croatian)	1	
Croser, P., Ebel, F.: Pneumatics, Festo Didactic GmbH & Co. 2002.	1	
B. Katalinic, Industrieroboter und Flexible Systeme für Drehteile, VDI Verlag, Düsseldorf, 1990.	0	
B. Katalinic, Intelligent Manufacturing Systems, skripta, Technische Universität Wien	0	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through a structured quality assurance system of the Faculty.

Basic description		
Course title	Basic Ship Dynamics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Introduction to basic methods of dynamic analysis of the ship. Understanding stochastic processes and their application in the ship dynamics. Developing the ability to work in small groups (teamwork).

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Specify the methods of dynamic analysis of the ship. Properly explain, and interpret the basic parameters of the waves as a random process and make a simple statistical analysis of random processes. Explain the energy spectrum and the autocorrelation function and describe the application of Fourier series in the analysis of stochastic dynamic response. Define and solve linear oscillating model of rigid floating bodies motion with one degree of freedom on the sea waves. Itemize and explain the consequences of excessive motion of the ship. Define the types and causes of ship vibrations.

1.4. Course content

Introduction to dynamic analysis of ship structures. Single and multi-degree of freedom models. Free oscillations. Forced steady state response. Fourier series: application to frequency response. Introduction to random processes and application in linear systems. Rigid floating body motion in one degree of freedom. Sea wave excitation. Hydrodynamic added mass and damping.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments -

1.7. Student's obligations

Course attendance, activity, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper	0.5	Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio		Homework					

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, seminar paper, activity, continuous knowledge testing (three mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Prpić-Oršić J.: Basic ship Dynamics, Faculty of Engineering University of Rijeka, Fintrade &Tours, 2009. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Prpić-Oršić J., Čorić V.: Seakeeping, Zigo, University of Rijeka, 2006. (in Croatian)
Senjanović, I.: Ship vibrations I, University of Zagreb, 1974. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course		
Title	*Number of copies*	*Number of students*
Prpić-Oršić J.: Basic ship dynamics, Faculty of Engineering University of Rijeka, Fintrade &Tours, 2009. (in Croatian)	10	8
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Basics of Ship Production	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Within this course students gain knowledge about the ship production in accordance with defined learning outcomes.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Distinguish materials ship production and other marine objects. Describe technology for protecting ship hull elements. Interpret reproduction of ship hull structure dimensions and shapes. Analyze and explain the configuration of the production lines. Define material flow of ship structure elements, subassemblies, assemblies and blocks. Describe the equipment and machines for prefabrication and fabrication of plates and profiles. Describe the production of ship outfitting components, blocks and modules. Analyze the ship hull preassembly and outfitting process. Interpret ship hull and equipment production breakdown. Describe and classify horizontal and vertical transportation.

1.4. Course content

Materials for construction of ships and marine objects. Corrosion Technology. Reproduction of dimensions and shapes of ship structure. Production lines. Material flow of plates, profiles, ship structure elements, subassemblies, assemblies and blocks. Prefabrication of plates and profiles, fabrication of ship structure elements, assembling ship's sections and blocks. Tools and machines for prefabrication and fabrication of plates and profiles. Ship equipment fabrication. Pre-assembly of the ship hull and its equipment. Ship hull and equipment breakdown. Ship sub assemblies, assemblies and sections outfitting. Painting. Horizontal and vertical transportation.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☒ laboratories
	☐ long distance education	☐ mentorship
	☒ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, sustained knowledge check, seminar paper, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper	1	Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, sustained knowledge check (two mid-term exams), written and oral exam or their combination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Storch, R. L. at al: Ship Production, 2nd edition, SNAME, 2007.
Furlan, Z., Lučin, N., Pavelić, A.: Shipbuilding Technology, Školska knjiga, Zagreb, 1986. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Wiebeck, E., Beyrodt, M., Winkler, Z.: Technologie des Schiffskorperbaus, VEB Verlag Technik, Berlin, 1980.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Storch, R. L. at al: Ship Production, 2nd edition, SNAME, 2007.	2	15
Furlan, Z., Lučin, N., Pavelić, A.: Shipbuilding Technology, Školska knjiga, Zagreb, 1986. (in Croatian)	10	15

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Basis of Machine Elements Design	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Development of theoretical knowledge of design and application of basis in machine elements by using traditional and numerical techniques.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Explain Hook law and Hook diagram. Explain fatigue of material and Wholer diagram. Applying Smith diagram. Applying tolerances and fits. Design welded vessel under pressure. Dimensioning of helical torsion spring. Calculate bolt tightening moment for fixing bolts. Analysing prestressed bolt joint. Design prestressed bolt joint. Dimensioning of shaft. Analysing stability of long shafts. Compare joints between shaft and hub.

1.4. Course content

Loading capacity of machine elements. Fatigue of material. Wholer diagram and Smith diagram. Tolerances, fits and surface roughness. Welded joints. Vessels under pressure. Bolt joints. Springs. Shafts. Long shafts. Joints between shaft and hub. Exercises: Design and construction of vessel under pressure, including sketches and drawings of nontrivial parts. Dimensioning of prestressed bolt joint, including sketches and drawings of bolt and joint.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, activity, homework, project tasks, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	0.5	Report		Practice	
Portfolio		Homeworks	0.5	Program	0.5		

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance. Oral examination through two mid-term exams. Continuous evaluation of accuracy, precision, completeness and creativity in solving the problem assignment. Written verification of acquired knowledge on the final exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Kraut's Mechanical Manual (In Croatian), Axiom, Zagreb, 1997., 2009.
Flender Technical Handbook (In English or German), free pdf-book on flender.com

1.11. Optional / additional reading (at the time of proposing study programme)

Decker, K.H., Elements of Machines (In Croatian or German)
Manual for Engineers IP1 (In Croatian), Školska knjiga, Zagreb, 1996.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course		
Title	*Number of copies*	*Number of students*
Kraut's Mechanical Manual (In Croatian), Axiom, Zagreb, 1997., 2009.	0	18
Flender Technical Handbook (In English or German), free pdf-book on flender.com	0	18
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Computer Applications in Engineering	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student's workload coefficient	4
	Number of hours (L+E+S)	15+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Acquiring knowledge and skills necessary for active participation in an computer aided engineering environment. This is primarily relating to the handling of personal computer operating system (Microsoft Windows) and the use of office applications (Microsoft Office) and general purpose engineering software (Mathcad, Matlab).

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Adopt the basic concepts of computer technology. Use Microsoft Windows operating system. Use office applications Microsoft Word and Microsoft Excel. Use Mathcad software. Use the basics of the functionality of the software package Matlab.

1.4. Course content

Basic concepts of computer technology (types of computers, computer hardware, computing infrastructure, operation systems). Usage of computers and managing data files (Microsoft Windows). Text processing (Microsoft Word). Spreadsheet calculating (Microsoft Excel). General purpose engineering software tools (Mathcad, Matlab).

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Attendance, class participation, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing (two mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Johnson, S.: Microsoft Office 2007 – On the palm of your hand, Miš, Zagreb, 2007. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Hahn, B. D., Valentine, D. T.: Essential MATLAB for Engineers and Scientists, Oxford, 2007.
Pritchard, P.: Mathcad - A Tool for Engineering Problem Solving, New York, 2011.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Johnson, S.: Microsoft Office 2007 - On the palm of your hand, Miš, Zagreb, 2007. (in Croatian)	1	150
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Computer Simulations in Engineering	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

General knowledge of computer simulation technology. Understanding the basis of mathematical modeling. Knowing capabilities and limitations of computer simulations. Identifying methods for solving engineering problems using computer simulations.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Correctly explain the methodology of mathematical modelling. Classify mathematical models typical of technical systems. Identify basic types of numerical network. Classify commercial software for numerical modelling. Explain the entire process of applying computer simulation in solving engineering problems. Perform a simulation of a simple problem of mechanical design, in available software.

1.4. Course content

Review of existing CAE systems. The process of mathematical modelling. Using finite-element model of solid body mechanics. Using computational fluid dynamics. Modelling of heat transfer. Introduction to commercial software and I-DEAS, CATIA, FLUENT. Structured and unstructured mesh, boundary condition definitions. Understanding the entire process of application of computer simulation for solving engineering problems.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Attendance, class participation, individual assignment.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper	2	Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Sustained knowledge check	0.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing, seminar paper.

1.10. Assigned reading (at the time of the submission of study programme proposal)

I-DEAS, CATIA, FLUENT User Manuals.

1.11. Optional / additional reading (at the time of proposing study programme)

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1.12. Number of assigned reading copies with regard to the number of students currently attending the course		
Title	*Number of copies*	*Number of students*
I-DEAS, CATIA, FLUENT User Manuals.	online copies	50
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Dynamics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills for determination of dynamics characteristics of motion of particles, systems of particles and rigid body. Capability of qualitative and quantitative analysis of basic characteristics of dynamical systems.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define and explain Newton's laws and the concept of inertial forces. Calculate the simpler examples based on the principles of the change of momentum, angular momentum and the law of change of kinetic energy of material particles. Define the concept of momentum, angular momentum as well as kinetic energy and mechanical work of a system of particles. Calculate the tasks based on the principles of the change of momentum, angular momentum and the principle of kinetic energy of a system of particles. Define the generalized coordinates and set up and solve the II. order Lagrange equations for easier dynamic systems. Analyze the dynamics of systems with variable masses. Define the mass moment of inertia of a rigid body. Classify and compare the methods of experimental determination of the mass moment of inertia of a rigid body. Apply the Euler equations of motion of a rigid body. Set up the loads and calculate the dynamic reactions for the rotation of a rigid body around the fixed axis. Apply this knowledge to the motion of the rotor in the bearings. Apply the gyroscopic theory of on the appropriate dynamic examples. Calculate and analyze the motion of material particles and rigid bodies in the case of collision. Calculate the center of impact.

1.4. Course content

Dynamics of particle. Inertial forces. D' Alemberts principle. Momentum and angular momentum. Mechanical work. Kinetic and potential energy. Power. Dynamics of a system of particles. Inertial forces. D' Alemberts principle. Momentum and angular momentum. Motion of the centre of mass. Momentum conservation. Kinetic energy. Mechanical work. Conservation of energy. Virtual work. Generalized coordinates and Lagrange' s equations of the II. order. Systems with variable masses.Rigid body dynamics. Mass moments of inertia. Equations of motion of rigid body. Planar motion of rigid body. Kinetic energy. Energy conservation. Power. Impulse and momentum. Spatial motion of rigid body. Euler' s equations of motion. Dynamic reactions for the rotation of a rigid body around the fixed axis. Rotation about fixed point of rigid body. Gyroscopic effect. Introduction in the theory of collision.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio		Homework	0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, 3 constructional exercises, continuous knowledge testing (two mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Krpan, M., Butković, M., Žigulić, R., Braut, S., Franulović, A., Dynamics – Theory and appliccations, Faculty of Engineering – University of Rijeka, 2001. (in Croatian)
Jecić, S.: Mechanics (Kinematics and Dynamics), Tehnička knjiga, Zagreb, 1989. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Beer , F.P., Johnston, E.R.: Vector Mechanics for Engineers – Dynamics, Mc.Graw Hill, New York, 1988.
Pustaić, D., Wolf, H., Tonković, Z.: Introduction in analytical mechanics with basics of theory of vibrations, Golden marketing / Tehnička knjiga, Zagreb, 2005. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Žigulić, R., Braut, S.: Dynamics – Theory and applications, Faculty of Engineering – University of Rijeka, 2012. (in Croatian)	16	14
Jecić, S.: Mechanics (Kinematics and Dynamics), Tehnička knjiga, Zagreb, 1989. (in Croatian)	3	14

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Elective Project	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	0+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Application of acquired knowledge and skills to solve practical problems in the field of associated course from which the project is elected.

1.2. Course enrolment requirements

Enrolled course from which the project is elected.

1.3. Expected course learning outcomes

Apply the knowledge and skills from professional content of the associated course. Solve practical task. Acquire competence for individually solving specific professional tasks.

1.4. Course content

Chosen chapter of associated course from which the project was elected.

1.5. Teaching methods	☐ lectures ☐ seminars and workshops ☐ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☒ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attending the consultation, individually solving task and writing the project report.

1.8. Evaluation of student's work

Course attendance		Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project	2	Sustained knowledge check		Report		Practice	
Portfolio		Individual task solving	3				

1.9. Assessment and evaluation of student's work during classes and on final exam

Assesses and evaluates the accuracy and completeness of the project task solution and its presentation.

1.10. Assigned reading (at the time of the submission of study programme proposal)

References listed for the associated course from which the project is elected.

1.11. Optional / additional reading (at the time of proposing study programme)

References listed for the associated course from which the project is elected.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Electrical Engineering	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Mastering basic concepts, postulates and methods of electrostatics, magnetostatics and electrical circuits. Describing behavior of electromagnetic circuits' main components and analysis of electrical circuits.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Describe and apply basic laws of electrostatics. Define and use basic electric quantities. Apply fundamental laws and methods of DC circuits. Describe and apply basic laws of magnetostatics. Analyse AC circuits. Organize and conduct electric measurements.

1.4. Course content

Electrostatics - basic concepts and laws. Basic concepts and laws of DC circuits. DC circuit analysis - methods and theorems. Magnetostatics - basic concepts and laws. Magnetic materials and circuits. Basic concepts and laws of AC circuits. Three-phase electric system – rotating magnetic field.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, homeworks, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	2	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, continuous knowledge testing (homeworks, mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Pinter, V.: Fundamentals of electrical engineering – part I, Tehnička knjiga, Zagreb, 1994. (in Croatian)
Pinter, V.: Fundamentals of electrical engineering – part II, Tehnička knjiga, Zagreb, 1994. (in Croatian)
Đurović, G.: Electrical engineerging I, Školska knjiga, Zagreb, 2004. (in Croatian)
Đurović, G.: Electrical engineerging II, Školska knjiga, Zagreb, 2004. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Šehović, E., Tkalić, M., Felja, I.: Fundamentals of electrical engineering - collection of examples (part 1), Tehnička knjiga, Zagreb, 1987. (in Croatian)
Felja, I., Koračin, D.: A collection of assignments and solved examples from fundamentals of electrical engineering, part 1.

and 2., Školska knjiga, Zagreb, 1991. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Pinter, V.: Fundamentals of electrical engineering - part I, Tehnička knjiga, Zagreb, 1994. (in Croatian)	14	
Pinter, V.: Fundamentals of electrical engineering – part II, Tehnička knjiga, Zagreb, 1994. (in Croatian)	10	
Đurović, G.: Electrical engineerging I, Školska knjiga, Zagreb, 2004. , (in Croatian)	11	
Đurović, G.: Electrical engineerging II, Školska knjiga, Zagreb, 2004. , (in Croatian)	10	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Energy Sources	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	45+0+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge in the field of energy engineering. Acquiring the basic knowledge required for attending lectures in the field of thermal and energy engineering.

1.2. Course enrolment requirements

Basic knowledge of thermodynamics.

1.3. Expected course learning outcomes

Describe the energy conversion and compare conventional energy sources. Describe ways of electricity production. Describe the use of nuclear energy and interpret the operation of nuclear power station. Define and describe the types of renewable energy sources. Describe the basic characteristics of hydro power usage. Describe the basic characteristics and ways to use the solar energy. Describe the basic characteristics of wind energy. Describe the basic characteristics of geothermal energy and biomass energy. Describe and compare ways of using environmental heat by heat pumps. Describe how to obtain and utilize the hydrogen as an energy source. Define and describe the basic principles of energy planning and energy policy.

1.4. Course content

World energy consumption. Conventional energy sources: coal, oil, natural gas. Energy conversion. Electrical energy. Nuclear power. Renewable energy sources. Energy from water: rivers and lakes, wave power. Solar energy: solar thermal energy, photovoltaic. Wind power. Geothermal energy. Biomass. Heat of environment - heat pumps as renewable energy systems. Hydrogen and fuel cells: technology and usage. Energy planning. Energy policy.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☐ exercises ☐ long distance education ☒ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course and fieldwork attendance, seminar work, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper	0.5	Experimental work	
Written exam		Oral exam	1	Essay		Research	
Project		Sustained knowledge check	1	Report		Practice	
Portfolio		Homework					

1.9. Assessment and evaluation of student's work during classes and on final exam

Course and fieldwork attendance, continuous knowledge testing (two mid-term exams), seminar work, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Udovičić, B.: Energy Engineering, Školska knjiga Zagreb, 1993. (in Croatian)
Knapp, V.: New Energy Sources, Školska knjiga Zagreb, 1993. (in Cropatian)
Several authors: Renewable Energy Sources, Energetika marketing, Zagreb, 2002. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Duffie, J.A., Beckmann, W.A.: Solar Engineering of Thermal Processes, John Wiley & Sons, NY, 1991.
Granić, G., ... : National Energy Programme, EIHP, Zagreb, 1998. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Udovičić, B.: Energy Engineering, Školska knjiga Zagreb, 1993. (in Croatian)	1	62
Knapp, V.: New Energy Sources, Školska knjiga Zagreb, 1993. (in Cropatian)	1	62
Several authors: Renewable Energy Sources, Energetika marketing, Zagreb, 2002. (in Croatian)	0	62

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Engineering Graphics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

The achievement of proficiency in the development and interpretation of engineering graphics by means of traditional tools and computer. The development of ability to utilize graphics as a system of communication in which the ideas are expressed clearly and in standard drafting formats.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Interpret and apply traditional and CAD techniques for the development of 2D geometrical model. Compare and distinguish the methods of shape description. Compare 3D primitives and interpret the emergence of complex objects. Interpret and apply ISO code system for linear size tolerances, fits, geometrical tolerances and surface texture. Interpret engineering graphics. Model and organize engineering documentation in accordance with the standards. Estimate personal contribution and the contribution of lecturer to the acquisition of contents.

1.4. Course content

Graphical communications. Traditional and CAD techniques, the role of the graphics. The shape description: projection theory, multi-view drawings, sectional views, pictorial representations. Standardization and standards. Technical documentation graphics: size description, tolerances and fits, geometrical tolerances, texture of technical surfaces.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☒ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance and activity (lectures, exercises), constructive works, continuous knowledge testing, homework, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	0.5	Report		Practice	
Portfolio		Constructive work	0.5	Homework	0.5		

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, homework, 2 constructive works, continuous knowledge testing (2 exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

M. Kljajin, M. Opalić: *Engineering Graphics,* Strojarski fakultet u Slavonskom Brodu,Slavonski Brod, 2010. (in Croatian)
G. Marunić, J. Butorac, S. Troha: *Engineering Graphics, Collection of Shape Description Problems*, Zigo Rijeka, Rijeka, 2008. (in Croatian)
Kraut` s Engineering Manual, SAJEMA, Zagreb, 2009. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

D. K. Lieu, S. Sorby: *Visualization, Modeling, and Graphics for Engineering Design*, Delmar Cengage Learning, 2009.
G. R. Bertoline, E. N. Wiebe: *Fundamentals of Graphic Communication*, Mc Graw-Hill, New York, 2005.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
M. Kljajin, M. Opalić: *Engineering Graphics,* Strojarski fakultet u Slavonskom Brodu,Slavonski Brod, 2010. (in Croatian)	10	211/62
G. Marunić, J. Butorac, S. Troha: : *Engineering Graphics, Collection of Shape Description Problems*, Zigo Rijeka, Rijeka, 2008. (in Croatian)	10	211/62
Kraut` s Engineering Manual, SAJEMA, Zagreb, 2009. (in Croatian)	10	211/62

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution´s quality assurance system.

Basic description		
Course title	Engineering Statistics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Acquiring basic knowledge and skills in probability and statistics needed for solving problems in engineering practice.

1.2. Course enrolment requirements

Mathematics I, Mathematics II.

1.3. Expected course learning outcomes

Define basic terms in descriptive statistics and perform statistical data analysis. Define and interpret correctly: random, events and probabilities of events. Express and interpret correctly the total probability rule and Bayes theorem. Apply rules for evaluating the probability of intersection and union of events, conditional distributions, total probability and Bayes theorem. Define and interpret correctly random variables, interpret correctly and calculate means and variances. Describe some basic probability distributions, interpret correctly their meaning and use them in typical experiments. Express and understand the central limit theorem. Estimate some parameters of a population or a probability distribution from samples (confidence intervals). Express and interpret correctly basic concept about statistical hypotheses tests, and particularly, explain the concept of goodness of fit test and perform it. Define and interpret correctly basic concepts of random vectors. Determine the linear regression functions for two-dimensional statistical data set and interpret the results correctly.

1.4. Course content

Descriptive statistics. Basics of probability theory: events, probability and probability space. Bayes theorem. Random variable: probability distribution function, cumulative distribution function, numerical parameters. Standard probability distributions. Central limit theorem. Samples. Confidence intervals. Testing of hypotheses, decisions. Goodness of fit test. Two-dimensional statistical data, numerical parameters. Two-dimensional random vectors. Regression and correlation.

1.5. Teaching methods		
	☒ lectures	☐ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☒ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Class attendance, activity, mid-term exams, tests, tests on computer.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	2	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, tests on computer, mid-term exams, tests on computer, written and oral exam

1.10. Assigned reading (at the time of the submission of study programme proposal)

Črnjarić-Žic N., Material of course and solved problems in Engineering statistics, Rijeka 2010. (in Croatian)
Elezović, N., Discrete probability; Random variables; Statistics and processes, Biblioteka Bolonja, Element, Zagreb 2007

(in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Tomašić, L.: Matematics IV, Tehnički fakultet, Rijeka 1993. (in Croatian)
Pauše, Ž.: Introduction to mathematical statistics, Školska knjiga Zagreb, 1993 (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Črnjarić-Žic N., Material of course and solved problems in Engineering statistics, Rijeka 2010.	110	110
Elezović, N.: Discrete probability, Random variables, Statistics and processes, Biblioteka Bolonja, Element, Zagreb 2007.	3	110

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	English Language I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	3
	Number of hours (L+E+S)	15+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Students should be able to use general purpose English as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level).

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Students should be able to use general purpose English as well as technical jargon at the elementary level according to the Common European Framework of Reference for Languages (up to B1 level). They should be able to: compare general with technical English on the basis of selected texts and topics; recognize and explain grammatical structures and principles typical of the university jargon from examples (Word Formation; Nouns; Compound Nouns; Definite and Indefinite Article; Perfect, Continuous and Passive Aspects; Modals; Comparison of Adjectives; Collocations); implement grammatical structures and aspects in written exercises; recognize terminology, key words and/or information in selected texts as well as differentiate and analyse relevant elements in them; describe and interpret accurately simple diagrams, charts, figures and mathematical formulae; write summaries, arguments and definitions.

1.4. Course content

Topics: Engineering Profession. Engineering Ethics. The Atom. Interaction in Atomic Systems. Materials in Electrical Engineering. Magnetic Materials and Electromagnetism. Energy. Characteristics of Capacitance. Lenz`s Law-Inductance. Ohm`s Law-Resistance. The A-C Cycle. Electric Quantities and Units. Grammatical Structures: Perfect, Continuous and Passive Aspects. Modals. Definite and Indefinite Articles. Nouns. Compound Nouns. Comparison of Adjectives.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attendance, activity in class and independent learning.

1.8. Evaluation of student's work

Course attendance	1	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.25	Report	0.25	Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance, presentation/report, various assignments and continuous evaluation of knowledge (two tests), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Bartolić Lj.: Technical English in Electronics and Electrical Power Engineering. Školska knjiga , Zagreb.
Mance, K.: Grammar File I. MudRi.
Murphy R.: English Grammar in Use. Cambridge University Press, 1994.
Vince M.: Intermediate Language Practice, Heinemann Elt, Oxford, 1998

1.11. Optional / additional reading (at the time of proposing study programme)

Selected vocational articles and texts at the upper intermediate level of the Cambridge and Longman University Press.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Bartolić Lj.: Technical English in Electronics and Electrical Power Engineering. Školska knjiga. Zagreb.	3	
Murphy R.: English Grammar in Use. Cambridge University Press, 1994.	15	
Vince M.: Intermediate Language Practice, Heinemann Elt, Oxford, 1998	18	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution`s Quality Assurance System.

Basic description		
Course title	English Language II	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	3
	Number of hours (L+E+S)	15+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Students should be able to use professional jargon independently, namely communicate with other experts in the field of the engineering profession and in an international environment, at the B2 level of the Common European Framework of Reference for Languages.

1.2. Course enrolment requirements

Attended course English Language I.

1.3. Expected course learning outcomes

Students should be able to use professional jargon like experts in Electrical Engineering who spend the most of their time in the plant, i.e. in the field, and to a lesser extent in the office, at the B2 level of the Common European Framework of Reference for Languages. Students should be able to: recognize and explain grammatical structures typical of the university jargon (Participles. Relative Clauses. Sequence of Tenses. Direct and Indirect Speech. Conditional Clauses. Final Clauses); implement grammatical structures in written exercises; analyse and differentiate terminology and relevant elements in texts; paraphrase certain relevant parts in the text; write summaries of the text, arguments and definitions; analyse and describe complex diagrams, charts, figures, processes, experiments and mathematical formulae; defend orally their own positions as well as critically evaluate individual solutions of a problem.

1.4. Course content

Topics: English as Lingua Terra. Introduction to Electric Power Systems. Switches, Circuit Breakers and Fuses. Conduction and Transmission of Electric Current. Transformers. Electric Generators and Motors. Information Age. Introduction to Digital Computers and Microcomputers. Fundamentals of Transistor Physics. Transistors.
Grammatical Structures: Participles. Relative Clauses. Sequence of Tenses. Direct and Indirect Speech. Modals. Compounds. Conditional Clauses, Final Clauses. Writing Summaries.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Attendance, activity in class and independent learning.

1.8. Evaluation of student's work

Course attendance	1	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.25	Report/Presentation	0.25	Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance, presentation/report, continuous evaluation of knowledge (two tests), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Bartolić Lj.: Technical English in Electronics and Electrical Power Engineering. Školska knjiga, Zagreb.
Mance, K.: Grammar File II. MudRi.

Murphy R.: English Grammar in Use. Cambridge University Press, 1994
Vince M.: Intermediate Language Practice, Heinemann Elt, Oxford 1998

1.11. Optional / additional reading (at the time of proposing study programme)

Selected vocational articles and texts at the upper intermediate level of the Cambridge and Longman University Press.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Bartolić Lj.: Technical English in Electronics and Electrical Power Engineering. Školska knjiga, Zagreb	3	
Vince M.: Intermediate Language Practice, Heinemann Elt, Oxford 1998	18	
Murphy R.: English Grammar in Use. Cambridge University Press, 1994	15	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution`s Quality Assurance System.

Basic description		
Course title	Environment Protection	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	45+0+0

1. COURSE DESCRIPTION

1.1. Course objectives

Define the basic concepts of ecology and environmental protection. To analyze the impact of the technological aspects of the environment. Describe the processes that affect pollution. Compare technologies and their impact. Distinguish the development of sustainable development. Argue the importance of sustainable development. Describe the current problems of global pollution. Distinguishing the basic concepts of ecology and environmental protection. Understanding the impact of technology on the environment.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Developing the skills of analysis and synthesis and creativity in solving problems. Developing the ability to adapt to new situations. Developing the ability to work in an interdisciplinary team, and communication with experts in other fields. Developing the ability to create and project management in the field of environmental protection. .

1.4. Course content

Introduction to the environment, the subject of ecology. Soil, atmosphere, water and sea. Interaction with the environment. Monitoring of the environment, particularly in the marine environment. Sampling from the environment. Measurement methods of analytical chemistry. Physical methods of measurement. Fluorescent methods. Basics of modeling processes in the environment. Environmental protection. Improving the environment. Ocean Engineering. Marine technology objects and its interaction with the environment. International conventions and norms.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☐ exercises ☐ long distance education ☒ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Attendance, activity, class participation, research and search the literature sources, making self-employment, consulting, independent learning, presentation of work.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam	1	Essay		Research	1
Project		Sustained knowledge check		Report		Practice	
Portfolio		Homework					

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Klepac, R.: Fundamentals of Ecology, JUREMA, Zagreb, 1980. (in Croatian)
Črnjar, M.: Economics and Environmental Policy, Ekonomski fakultet, Rijeka, 2002. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Dobrinić, J., Bonato, J.: Physics, Pomorski fakultet, Rijeka, 2009. (in Croatian)
Reible, D. D.: Fundamentals of Envirenmental Engineering, Springer, London, 1999.
Matas, M., Simonić, V., Šobot, S.: Protection of the Environment today for tomorrow, Školska knjiga, Zagreb, 1989. (in Croatian)
Pandey, G. N., Carney, G. C.: Envirenmental Engineering, Tata McGraw-Hill, New Delhi, 1989

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Klepac, R.: Fundamentals of Ecology, JUREMA, Zagreb, 1980. (in Croatian)	1	
Črnjar, M.: Economics and Environmental Policy, Ekonomski fakultet, Rijeka, 2002. (in Croatian)	1	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Final Work	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	10
	Number of hours (L+E+S)	-

1. COURSE DESCRIPTION

1.1. Course objectives

The Final Work is an individual assignment and verification of student expertises, which should show the appropriate level of engineering skills for individually solving specific professional task.

1.2. Course enrolment requirements

Enrolled course from which the Final Work is selected.

1.3. Expected course learning outcomes

Apply acquired knowledge, expertises and skills of the content of Final Work associated course. Solve practical task. Acquire competence for individually solving specific professional task.

1.4. Course content

The content of the Final Work is based on the application of acquired knowledge from educational programs at the undergraduate university studies. Final thesis can be specified from a particular course specific professional content and exceptionally from course that belongs to the group of shared content, when it represents a broader entity with a particular course specific content of the studies. Student enrollers the Final Work by enrolling the last semester. Thesis of the Final Work is establishes by Commission for Final Works, based on suggestion of teacher who will mentor the Final Work.

1.5. Teaching methods	☐ lectures ☐ seminars and workshops ☐ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☒ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attending the consultation, individually solving task and writing the Final Work report.

1.8. Evaluation of student's work

Course attendance		Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Sustained knowledge check		Report		Practice	
Portfolio		Individual task solving	8	Final work in written form	2		

1.9. Assessment and evaluation of student's work during classes and on final exam

Assesses and evaluates the accuracy and completeness of a given task solving process, the Final Work written report, and its oral presentation

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Fluid Mechanics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	45+30+0

2. COURSE DESCRIPTION

1.1. Course objectives

Understanding the physical meaning of laws and equations of fluid mechanics and developing students' abilities to solve problems related to the field of fluid mechanics and the development of independent work and projects related to various problems involving fluid mechanics.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define and describe fluid properties. Define and describe fluid statics: Euler equation of fluid statics, relative fluid movement, stability, fluid pressure on flat and curved surfaces, buoyancy. Define and describe the basic laws of fluid dynamics: Conservation of Mass - The Continuity Equation, The Linear Momentum and Moment of Momentum Equations with the Bernoulli equation, The Energy Equation with the modified Bernoulli equation. Define and describe laminar and turbulent viscous fluid flow. Apply the basic laws of fluid mechanics to calculate the physical values of the fluid flow, orifice flow, flow through the wide openings, Venturi meter and Pitot-Prandtl tube. Calculate fluid flow losses through a complex pipeline system.

1.4. Course content

Introduction to Fluid Mechanics. Basic physical values. Fluid properties. Fluid statics. Euler equation of fluid statics with solutions. Pressure measurement devices. Relative fluid motion. Stability. Fluid forces on flat and curved surfaces. Buoyancy. Fluid kinematics. Velocity and acceleration. Circular motion and discharge. Fluid dynamics. Basic laws of fluid dynamics. Conservation of Mass - The Continuity Equation, The Linear Momentum and Moment of Momentum Equations with the Bernoulli equation, The Energy Equation with the modified Bernoulli equation. Euler equation of motion. Application of the Bernoulli equation: orifices, weirs, Pitot tube, Venturi meter. Viscosity and viscosity measurement. Relation between the laminar and turbulent flow. Dimensional analysis. Real fluid flow. Pipe flow losses. Cavitation. Flow around bodies. Introduction to free surface flow. Introduction to compressible flow.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2.5	Activity/Participation	-	Seminar paper	-	Experimental work	-
Written exam	1	Oral exam	-	Essay	-	Research	-
Homework	-	Sustained knowledge check	1.5	Report	-	Practice	-
Portfolio	-						

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, homework, continuous knowledge testing (two mid-term exams), written exam

1.10. Assigned reading (at the time of the submission of study programme proposal)

L. Sopta, L. Kranjčević, Fluid Mechanics, script. Faculty of Engineering, Rijeka, 2004. (in Croatian)
Bruce R. Munson, D. F. Young, T. H. Okiishi, Fundamentals of Fluid Mechanics, 4th Updated Edition, John Wiley and Sons, 2003.
Streeter, V.L, Wylie E.B., Fluid mechanics, 8th edition, McGraw Hill, 1985.

1.11. Optional / additional reading (at the time of proposing study programme)

Kakac, S., Liu, H.: Heat exchangers, CRC Press, Florida, 2002.
Kays, W.M., London, A.L.: Compact heat exchangers, McGraw-Hill Book Co., NY,1984.
Course handout.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
L. Sopta, L. Kranjčević, Mehanika fluida, skripta. Tehnički fakultet Rijeka, 2004.	.pdf files – as needed	49
Bruce R. Munson, D. F. Young, T. H. Okiishi, Fundamentals of Fluid Mechanics, 4th Updated Edition, John Wiley and Sons, 2003.	1	49
Streeter, V.L, Wylie E.B., Fluid mechanics, 8th edition, McGraw Hill, 1985.	1	49

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Introduction into Finite Element Method	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills to solve practical problems with the finite element analysis of solids.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define stiffness matrix, load vector and finite element equation for basic types of finite elements. To assembly global stiffness matrix, displacement vector and load vector. To apply boundary conditions on the global stiffness matrix. Discretize structure for practical problems. Using finite element method calculate displacement and stress fields for linear structures, planar structures and solids. To asses validity of obtained results.

1.4. Course content

Introduction. Application of FEM in solid mechanics. Introduction to the forming of finite element stiffness matrix, load vector and finite element equation. Local and global coordinate systems. Boundary conditions. Structure equation. Basic application in rods, beams, trusses, frames, plates and bodies.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, activity, homework, seminar paper, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper	1	Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check		Report		Practice	
Portfolio		Homework	0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, homework, seminar paper), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Brnić, J., Čanađija, M.: "Finite element analysis of solids", Fintrade, Rijeka, 2009. (in Croatian)
Brnić, J.: "Elastomechanics and plastomechanics", Školska knjiga, Zagreb, 1996. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Bathe, K. J.: "Finite Element Procedures", Prentice Hall, Englewood Cliffs, 1996.
Zienkiewicz, O. C., Taylor, R. L.: "The Finite Element Method", Vol. 1, Butterworth-Heinemann, 2000.
Cook, R. D., Malkus, D. S., Plesha, M. E., Witt, R. J.: "Concepts and Applications of Finite Element Analysis", John Wiley & Sons, 2001.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Brnić, J., Čanađija, M.: “Finite element analysis of solids”, Fintrade, Rijeka, 2009. (in Croatian)	10	1
Brnić, J.: "Elastomechanics and plastomechanics ", Školska knjiga, Zagreb, 1996. (in Croatian)	13	1

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution’s quality assurance system.

Basic description		
Course title	Introduction to Marine Vessels	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Within this course students learn a basic knowledge about characteristics and systematization of vessels in accordance with course defined learning outcomes.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Use basic terminology and professional terms regarding vessels. Explain and interpret the basic characteristics and specifications of vessels. Describe and present parts of the ship hull, superstructure and ship equipment. Define basic types, dimensions and characteristics of the ship hull form. Distinguish and present the main elements of the ship hull structure. Explain and interpret the fundamentals of statics and dynamics of vessels. Explain and distinguish elements and configurations of ship main engine and propulsion systems. Systematize and classify vessels according to their purpose, type of cargo, type of main engine, type of propulsion, hull construction method, size, area of navigation and materials for the construction of the hull. Use IMO conventions, classification rules, guidelines, regulations and standards.

1.4. Course content

Marine vessels development. Vessels, definitions. Basic characteristics of vessels. Selection and specification of the ship. Vessels types regarding its structural characteristics. Hull, superstructure, equipment. General plan of the ship. Hull form and dimensions. Characteristics, terms and professional terminology. Flotation and stability of the ship. Exploitation functionality of vessels. Cargo unloading/loading procedures and its positioning. Systematization of vessels according to: purpose, main engine type, method of hull construction, size, area of navigation, hull construction material, type of operation, type of propulsion. Classification. Conventions, rules, guidelines and recommendations. Regulations and standards.

1.5. Teaching methods		
	☒ lectures	☐ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☒ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, sustained knowledge check, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, sustained knowledge check (two mid-term exams), written and oral exam or their combination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Furlan, Z. i dr.: Basics of Shipbuilding, Školska knjiga, Zagreb, 1989. (in Croatian)
Tupper, E.: Introduction to Naval Architecture, Butterworth-Heinemenn, Oxford, 1996.

1.11. Optional / additional reading (at the time of proposing study programme)

Zubaly, B.R.: Applied Naval Architecture, Cornell Maritime Press Inc., Centreville, Maryland, 1996.
Kemp. J.F. & Young, P.: Ship Construction, Sketches & Notes, Heinemann Newnes, Oxford, 1989.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Furlan, Z. i dr.: Basics of Shipbuilding, Školska knjiga, Zagreb, 1989. (in Croatian)	10	45
Tupper, E.: Introduction to Naval Architecture, Butterworth-Heinemenn, Oxford, 1996.	1	45

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Introduction to Modern Physics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Adoption of theoretical knowledge and develop the ability to differentiate properties and concepts of classical and modern physics. Forming a proper view of the interpretation of physical phenomena and their applications in engineering.

1.2. Course enrolment requirements

None-

1.3. Expected course learning outcomes

Parsed fields of classical, relativistic and quantum physics. Define fundamental physical quantities and units of measure. Identify features an exact approach to physical phenomena. Comparable phenomena in continuum mechanics and atomic physics. Distinguish between wave and particle properties of matter. Analyze the interaction between radiation and matter. Develop and independently argue simpler problems. Apply learned knowledge to problem-solving tasks.

1.4. Course content

The laws of motion, the relativity of motion. Harmonic oscillation. Muted and forced oscillation. Mechanical waves. The superposition of waves, standing waves. Doppler effect. The electromagnetic oscillations. Electromagnetic waves. Geometric optics. Physical optics, interference, diffraction, polarization. Elements of quantum physics. The structure of matter, the Bohr model of the atom. The quantum numbers. Pauli principle and consequences. The interaction of radiation with matter. Photoelectric effect, Compton effect, the formation of pairs.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation	0.5	Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	1	Report		Practice	
Portfolio		Homework					

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing, written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Dobrinić, J.: Physics (waves, optics, structure of matter), Tehnički fakultet, Rijeka, 1998. (In Croatian)
Glavan, N., Mandić, L., Dobrinić, J.: Solved examples in Physics II, Tehnički fakultet, Rijeka, 2004. (In Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Henč-Bartolić, V. i sur.: Waves and Optics, Školska knjiga, Zagreb, 1998.
Dobrinić, J., Bonato, J.: Physics , Pomorski fakultet, Rijeka, 2010.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course		
Title	*Number of copies*	*Number of students*
Dobrinić, J.: Physics (waves, optics, structure of matter), Tehnički fakultet, Rijeka, 1998. (In Croatian)	12	
Glavan, N., Mandić, L., Dobrinić, J.: Solved examples in Physics II, Tehnički fakultet, Rijeka, 2004. (In Croatian)	13	
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Kinematics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	30+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills for determination of kinematic characteristics of motion of particles and rigid body. Capability of qualitative and quantitative analysis of basic characteristics of motion as trajectory, displacement, velocity and acceleration.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define the space motion of material particles in Descartes, cylindrical, spherical and natural coordinate system. Calculate the trajectory as well as velocity and acceleration components of material particles in different coordinate systems. Transform the velocity and acceleration from one coordinate system to another. To analyze the motion of material particles during motion. Define the degrees of freedom of motion and types of motion of a rigid body. Calculate the velocity and acceleration of translation and rotation about a fixed axis of a rigid body. Calculate the velocity and acceleration of the plane motion of a rigid body by applying analytical and grafoanalytical methods. To analyze the motion of planar mechanisms. Calculate the angular velocity and angular acceleration as well as speed and acceleration in the case of motion about a fixed point. To analyze the general case of motion of a rigid body. Distinguish the relative motion of particles and rigid bodies from a simple motion.

1.4. Course content

Kinematics of particles. Coordinate systems. Types of linear motion. Harmonic and damped oscillation. Depending motion of the particles. Curvilinear motion. Spatial motion of particles in Descartes, cylindrical, spherical and natural coordinate system. The transformation of coordinates, velocity and acceleration between different coordinate systems. Complex motion of particles. Kinematics of rigid bodies. Degrees of freedom. Translational motion. Rotation about a fixed axis. Planar motion of the body. Determination of velocity and acceleration of planar mechanisms. Motion about a fixed point. The general case of motion. Complex motion of a rigid body.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	2	Report		Practice	
Portfolio		Homework	0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, 3 constructional exercises, continuous knowledge testing (two mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Žigulić, R., Braut, S.: Kinematics, Faculty of Engineering – University of Rijeka, 2012. (in Croatian)
Jecić, S.: Mechanics (Kinematics and Dynamics), Tehnička knjiga, Zagreb, 1989. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Beer , F.P., Johnston, E.R.: Vector Mechanics for Engineers – Dynamics, Mc.Graw Hill, New York, 1988.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Žigulić, R., Braut, S.: Kinematics, Faculty of Engineering – University of Rijeka, 2012. (in Croatian)	10	18
Jecić, S.: Mechanics (Kinematics and Dynamics), Tehnička knjiga, Zagreb, 1989. (in Croatian)	10	18

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Marine Auxiliary Machinery	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills to solve practical problems in the field of marine auxiliary machinery.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define elements of ship pipelines and pumps. Analyze pumps in serial or parallel connection and NPSH value. Describe parts and working principle of centrifugal separators. Describe and compare filtering equipment. Describe and compare ship fresh water generators. Describe and compare types of heat exchangers on ships. Describe and compare hydraulic steering gears. Describe parts and design of ship shaft lines.

1.4. Course content

Generally on marine auxiliary machinery. Rules for design and maintenance of marine auxiliary machinery. Ship pumps. Heavy fuel oil and lubricating oil centrifugal separators. Filters. Fresh water generators. Heat exchangers. Compressors. Types of ship propulsion plants, application and arrangement on ships. Marine steering gears. Shaft line. Marine reduction gears and propulsors.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☒ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing (two mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Ozretić, V.: Marine Auxiliary Machines and Devices, Dalmacijapapir, Split, 1996. (in Croatian)
Martinović, D.: Marine Machinery Systems, Digital point, Rijeka, 2005. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Smith, D. W.: Marine Auxiliary Machinery, Butterworths, London, 1988.
Knak, C.: Diesel Motor Ships, Engines and Machinery, Institute of Marine Engineers, 1990.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Ozretić, V.: Marine Auxiliary Machines and Devices, Dalmacijapapir, Split, 1996. (in Croatian)	8	22
Martinović, D.: Marine Machinery Systems, Digital point, Rijeka, 2005. (in Croatian)	3	22

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Marine Hydrodynamics I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	8
	Number of hours (L+E+S)	45+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Understanding the problems of ship resistance and propulsion. Understanding the procedures of ship and propeller model tests associated with resistance and propulsion. Ability to solve a given problem in order to determine the interaction of the ship, propulsion engine and propeller.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Describe the phenomena in the water flow around the ship's hull. Distinguish components of ship resistance and explain the methods used to determine the ship resistance. Describe the main characteristics of screw propellers and explain the theory of propeller action. Describe the procedure of ship and propeller model tests associated with the ship resistance and propulsion. Explain the interaction of the main engine and propeller, and explain the relations between resistance and propulsion of the ship. Calculate and analyze the ship resistance and the characteristics of propellers.

1.4. Course content

Ship resistance. Flow past ship hulls. Components of ship resistance. Resistance in shallow water. Determination of ship resistance. Model tests. Traditional and standard series. Regression based methods. Effects of the hull form to resistance. Ship propulsion. Propulsion devices. Ship screw propeller. Geometry of the ship screw propeller. Theory of propeller action. Interaction between hull and propeller. Components of propulsive efficiency. Propeller tests. Propeller cavitation. Matching the propeller with the engine. Propeller design. Special types of propellers: ducted propellers, controllable pitch propellers, contra-rotating propellers. Other types of propulsion devices: vertical-axis propellers, waterjets, transverse and azimuthing thrusters, podded propellers. Ship trials.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☒ fieldwork	☒ individual assignment ☐ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attendance at lectures, activity in class, report of laboratory exercises, self-learning.

1.8. Evaluation of student's work

Course attendance	3	Activity/Participation	0.5	Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project	1.5	Sustained knowledge check	2	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance at lectures, activity in class, report of laboratory exercises, continuous knowledge assessment (two mid-term exams), written and oral examination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Lewis, E. V., (ed.), Principles of Naval Architecture, Vol. II - Resistance, Propulsion and Vibration, The Society of Naval Architects and Marine Engineers, Jersey City, 1988.

Molland, A.F., Turnock, S.R., Hudson, D.A., Ship Resistance and Propulsion - Practical Estimation of Propulsive Power, Cambrodge University Press, New York, 2011.
Carlton, J. S., Marine Propellers and Propulsion, Butterworth - Heinemann, Oxford, 2007.

1.11. Optional / additional reading (at the time of proposing study programme)

Harvald, Sv. Aa., Resistance and Propulsion of Ships, John Wiley & Sons, New York, 1983.
Sentić, A., Fancev, M., Ship Resistance and Propulsion Problems, Brodogradnja, Zagreb, 1956. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Lewis, E. V., (ed.), Principles of Naval Architecture, Vol. II - Resistance, Propulsion and Vibration, The Society of Naval Architects and Marine Engineers, Jersey City, 1988.	1	15
Molland, A.F., Turnock, S.R., Hudson, D.A., Ship Resistance and Propulsion - Practical Estimation of Propulsive Power, Cambrodge University Press, New York, 2011.	1	15
Carlton, J. S., Marine Propellers and Propulsion, Butterworth - Heinemann, Oxford, 2007.	1	15

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Materials I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+30+0

3. COURSE DESCRIPTION

1.1. Course objectives

Introduction of different types of materials, their structure, properties and specificities and their application in the engineering.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Analyze and define the types of chemical bonds and crystal systems of metal and ceramics. Define and analyse the ideal and real structure of materials and describe the influence of structure on material properties. Draw and explain the binary equilibrium ϑ, c diagrams, determine the phases and their mass for the eutectic, peritectic and eutectoid reaction, determine the microstructure and explain the impact of the alloying element. Define and explain the polymers, the polymerization reaction and the different classifications of polymeric materials. Display properties and areas of application for PE, PP, PVC, PC, PMMA, PS, PTFE, Bakelite, epoxy resins, rubber and ways of processing and their use. Explain the difference between traditional and technical (advanced) of ceramic material and indicate their application. Explain the difference between fiber-reinforced, laminates and honeycomb sandwich structure of the composite materials.

1.4. Course content

Definition and classification of materials. Trends of application of materials in engineering. Structure of matter. Atomic and molecular bonds and properties of materials. Amorphous and crystal structure. Crystal systems. Miller indices. Methods for crystal structure analysis. Imperfections in crystals. Solid solutions. Diffusion. Phase transition. Phase diagrams for metals and non-metals. Two-component and three-component alloy systems. Classifications of polymeric materials. Obtaining synthetic polymers. Structure and properties of macromolecules. Structure and properties of thermoplastic, thermosetting and elastomers. Crystallinity of polymers. Special properties of polymers. Applications of polymer materials. Ceramic materials in engineering. Structure of ceramics. Phase diagrams of ceramics. Obtaining and properties of technical ceramics. Composite materials- definitions, basic concepts and classification. Structure of composite materials and their applications in engineering.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, participation in teaching, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation	0.5	Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	0.5	Report		Practice	
Portfolio		Homework					

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, participation in teaching, sustained knowledge check (three mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Callister, W. D., Jr., Fundamentals of Material Science and Engineering, John Wiley & Sons, Inc, 2001.
Katavić, I., Introduction to materials (in Croatian), Sveučilište u Rijeci, 1997.
Pomenić, L.: Materials I, 2007. ,361 str., http://www.riteh.hr/zav_katd_sluz/zm/osn_pod/2-NASTAVA/MATERIJALI%20I/MATERIJALI%20I.html

1.11. Optional / additional reading (at the time of proposing study programme)

Schwartz, M., Encyclopaedia of Materials, Part and Finishes, second edition, CRC Press, 2002.
Lehman; R. L., Materials Mechanical Engineering Handbook, CRC, 1999.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Callister, W. D., Jr., Fundamentals of Material Science and Engineering, John Wiley & Sons, Inc, 2001.	1	155
Katavić, I., Introduction to materials (in Croatian), Sveučilište u Rijeci, 1997.	19	155
Pomenić, L.: Materials I, 2007. ,361 str., http://www.riteh.hr/zav_katd_sluz/zm/osn_pod/2-NASTAVA/MATERIJALI%20I/MATERIJALI%20I.html		155

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Materials II	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Student will be informed with production of materials and material properties, same as microstructure characterization. Moreover, student will acquire basic modification methods of alloy properties.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Analyse the application of equilibrium diagrams. Define the relation between microstructure and material properties. Describe the basic properties of materials. Analyse the methods of materials testing. Define the mechanisms and methods of material properties modification.

1.4. Course content

Production of metals and alloys. Iron - carbon diagram. Non-ferrous phase diagrams of metals. Microstructure characterisation. Optical microscopy. Electron microscopy. Microstructure and properties of materials. Theoretical and real strength of materials. Basic mechanical properties of materials. Tensile strength test results. Engineering and true stress-strain curve. Ultimate tensile strength. Yield strength. Modulus of elasticity. Hardness. Tribological properties of materials. Mechanisms and methods of alloy properties modification. Corrosion properties of materials. Electrical properties of materials. Magnetic properties of materials. Permanent and non-permanent magnets.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☒ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, homework preparation, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio		Homework	1				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, homework, sustained knowledge check (two mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Filetin, T., Kovačiček, F., Indof, J., Properties and application of materials, FSB, Zagreb, 2002. (in Croatian)
Stupnišek, M., Cajner, F., Fundamentals of heat treatment of metals, FSB, Zagreb, 2001. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Novosel, M., Krumes, D., Special steels, Sveučilište J. J. Strossmayera u Osijeku, Slavonski Brod, 1998. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Filetin, T., Kovačiček, F., Indof, J., Properties and application of materials, FSB, Zagreb, 2002. (in Croatian)	2	142
Stupnišek, M., Cajner, F., Fundamentals of heat treatment of metals, FSB, Zagreb, 2001. (in Croatian)	2	142

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Mathematics I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1	
ECTS credits and teaching	ECTS student 's workload coefficient	7
	Number of hours (L+E+S)	45+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Acquiring basic knowledge and skills in linear algebra and calculus.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define and correctly interpret basic notions in linear algebra, single-variable functions, and single-variable calculus. State and correctly interpret basic results in linear algebra and single-variable calculus. Carry out basic computations with matrices, vectors, determinants; determine solutions of systems of linear equations. Apply vector operations to compute some areas, volumes; determine equations of planes and lines. Compute limit values and derivatives of single-variable functions. Apply integration rules and evaluate indefinite and definite integrals of some function.

1.4. Course content

Solving systems of linear equations. Matrices. Determinants. Vectors and analytical geometry in space. Single-variable functions. Limit values and continuous functions. Elementary functions. Derivatives. Indefinite and definite integrals.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, activity/participation, mid-term exams, and tests.

1.8. Evaluation of student's work

Course attendance	3	Activity/Participation		Seminar paper		Experimental work	
Written exam	1.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	2.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity/participation, sustained knowledge check (mid-term exams, tests), and written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Slapničar I.: Mathematics 1, Sveučilište u Splitu FESB, Split 2002, online book (in Croatian)
Slapničar I.: Mathematocs 1 – Workbook, Sveučilište u Splitu FESB, Split 2010, online book , (in Croatian)
Jurasić, K.-Dražić, I.: Mathematics I, Workbook, Tehnički fakultet, Rijeka, 2008. (in Croatian)
Štefan Trubić M., Sopta L., Črnjarić-Žic N., Maćešić S.: Mathematics, a collection of tasks: integrals, ordinary differential equations, functions of several variables, Rijeka 2012, (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Elezović N., Aglić A., Linear algebra - a collection of tasks, Element, Zagreb 1999 (in Croatian)
Demidovič, B. P.: Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, (in Croatian)
Devide, V. i oth.: Solved Problems in mathematics, 1-4, Školska knjiga Zagreb, 1990 (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Slapničar I.: Mathematics 1, Sveučilište u Splitu FESB, Split 2002, online book (in Croatian)	140	
Slapničar I.: Mathematocs 1 – Workbook, Sveučilište u Splitu FESB, Split 2010, online book , (in Croatian)	140	
Jurasić, K.-Dražić, I.: Mathematics I, Workbook, Tehnički fakultet, Rijeka, 2008. (in Croatian)	5	
Štefan Trubić M., Sopta L., Črnjarić-Žic N., Maćešić S.: Mathematics, a collection of tasks: integrals, ordinary differential equations, functions of several variables, Rijeka 2012, (in Croatian)	20	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Mathematics II	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1	
ECTS credits and teaching	ECTS student 's workload coefficient	7
	Number of hours (L+E+S)	45+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Acquiring basic knowledge and skills in application of calculus for single-variable functions, calculus for multi-variable functions, and ordinary differential equations.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Correctly interpret and apply single-variable calculus. Define and correctly interpret basic notions of multi-variable calculus and ordinary differential equations (ODE). Compute derivatives and some integrals of multi-variable functions, and solutions of some ODE. Compute polynomial approximations; find local extremes of single-variable and multi-variable functions by applying differential calculus. Compute some lengths, areas, and volumes by applying integral calculus. Model vibrations in simple mechanical and electrical systems by applying ODE.

1.4. Course content

Applications of single-variable calculus. Multi-variable functions. Partial derivatives, differential calculus for two-variable functions and applications (approximations, local extremes, optimal control problems). Double integral and applications. First order ODE. Higher order ODE. Systems of ODE. Applications of ODE.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, activity/participation, mid-term exams, and tests.

1.8. Evaluation of student's work

Course attendance	3	Activity/Participation		Seminar paper		Experimental work	
Written exam	1.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	2.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity/participation, sustained knowledge check (mid-term exams, tests), and written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Slapničar I.: Mathematics 2, Sveučilište u Splitu FESB, Split 2002, online book, (in Croatian)
Štefan Trubić M., Sopta L., Črnjarić-Žic N., Maćešić S.: Mathematics, a collection of tasks: integrals, ordinary differential equations, functions of several variables, Rijeka 2012, (in Croatian)
Demidovič, B. P. : Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Sopta, L.: Mathematics 2, Tehnički fakultet Sveučilišta u Rijeci, 1995, (in Croatian)
Kamenarović, I.: Mathematics in Engineers 1, Tehnički fakultet Sveučilišta u Rijeci, 1997, (in Croatian)

Kreyszig E., Advanced Engineering Mathematics, John Wiley & Sons, Inc., 1993

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Slapničar I.: Mathematics 2, Sveučilište u Splitu FESB, Split 2002, online book, (in Croatian)	140	
Štefan Trubić M., Sopta L., Črnjarić-Žic N., Maćešić S.: Mathematics, a collection of tasks: integrals, ordinary differential equations, functions of several variables, Rijeka 2012, (in Croatian)	20	
Demidovič, B. P. : Tasks and solved examples from mathematics, Tehnička knjiga, Zagreb, (in Croatian)	10	

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Modelling by Computer	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

The development of recent engineering graphics understanding and the familiarizing with computer techniques of 3 and 2D geometrical modelling.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Recognise the design process and the role of computer modelling through this process. Explain the use of geometry for the modelling. Compare and apply 3D computer techniques for 3D object modelling. Interpret parametric modelling. Apply feature modelling. Distinguish the application of 3D model data base. Organize the modelling of 3D and 2D assembly model. Estimate personal contribution and the contribution of lecturer to the acquisition of contents.

1.4. Course content

Engineering design and C techniques. The design process. Geometry for the modelling: coordinates for 3D CAD modelling, geometrical entities and relations, 3D primitives, user coordinate system, transformations. Modelling of 3 and 2D models. Types of 3D CAD models: wire frame, surface and solid model (methods CSG, BREP). Parametric modelling, feature modelling. The 3D model data base application. Merging physical and virtual world – new technologies.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☒ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance and activity (lectures, exercises), constructive work, continuous knowledge testing, homework, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	0.5	Report		Practice	
Portfolio		Constructive work	1.5	Homework	0.5		

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, homework, constructive work, continuous knowledge testing (2 exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Engineering Manual IP1, Školska knjiga, Zagreb, 1996. (in Croatian)
S. D. Lockhart, C. M. Johnson: Engineering Design Communication, Prentice Hall, New Jersey, 2011.

1.11. Optional / additional reading (at the time of proposing study programme)

G. Scott Owen et al.: HiperGraph (on-line), ACM SIGGRAPH Education Committee, http://www.siggraph.org/education/materials/HyperGraph/hypergraph.htm, 2005.
D.D. Bedworth et al: Computer-Integrated Design and Manufacturing, McGraw–Hill International Editions, 1991.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Engineering Manual IP1, Školska knjiga, Zagreb, 1996. (in Croatian)	6	50
S. D. Lockhart, C. M. Johnson: Engineering Design Communication, Prentice Hall, New Jersey, 2011.	1	50

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution´s quality assurance system.

Basic description		
Course title	Organization and Economics of Business Systems	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Assuming theoretical concepts and knowledge of the organization and business economics.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Explain the concept of business systems and building the business system. Define the basic principles of the organization. Define the management of systems and information in the enterprise. Analyze the types of organizational structures. Analyze the evaluation of jobs. Distinguish the ownership, the management and the leadership. Define the principles of management and leadership. Analyze the teamwork. Define the business policies. Describe the principles and methods of planning. Define the long-term and operational plans. Analyze network planning technique. Define the plant as an economic system. Analyze income and expenses. Distinguish the Income Statement and Balance Sheet. Define the effects of the business.

1.4. Course content

The definition of a business system. The evolution of the business system. Factory as a business system. Building the business system. The basic principles of the organization. Definition and managing of business system. The information in the enterprise. Types of organizational structures. Design of the business system. Evaluation of jobs. Ownership. Management. Leadership. The principles of management and leadership. Teamwork. Business policy. Planning. Principles and methods of planning. Network planning techniques. Plans of the business system. Long-term and operational plans. Using of computers in planning. Factory as an economic system. Income and expenses. Types of costs. Break even. Income Statement. Balance Sheet. Effects of business.

1.5. Teaching methods		
	☒ lectures	☐ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Attendance, class participation, independent learning.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance, class participation, continuous assessment (two mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Mikac, T., Ikonić, M.: Organization of Business Systems, Tehnički fakultet Sveučilišta u Rijeci, 2008. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Novak, M., Sikavica, P.: Business Organization, Informator, Zagreb, 1999. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Mikac, T., Ikonić, M.: Organization of Business Systems, Tehnički fakultet Sveučilišta u Rijeci, 2008. (in Croatian)	2	100

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Physical and Health Education	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	1
	Number of hours (L+E+S)	0+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

The general objective of the educational field of Physical and Health Education is to satisfy man`s biosocial need for movement through appropriate kinetic activities, thus satisfying this general need by increasing the adaptive and creative capabilities in contemporary life and work conditions.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Through appropriate kinetic activities satisfy man`s biosocial need for movement.

1.4. Course content

The course content of the educational field of Physical and Health Education shall be implemented through regular (field athletics, football, basketball, volleyball, handball, swimming and water- polo, fitness) and optional (skiing, sailing, rowing, trekking, tennis and rafting) programmes.

1.5. Teaching methods	☐ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance.

1.8. Evaluation of student's work

Course attendance	1	Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Sustained knowledge check		Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Regular course attendance.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Medved, R.: Sports medicine, Medicinska knjiga, Zagreb. (in Croatian)
Tuka, K.:Physiology of sport, Sportska tribina, Zagreb. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Medved, R.: Sports medicine, Medicinska knjiga, Zagreb. (in Croatian)	1	

Tuka, K.:Physiology of sport, Sportska tribina, Zagreb. (in Croatian)	1	
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution`s Quality Assurance System.		

Basic description		
Course title	Processes of Heat Treatment	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Student will be familiar with the processes of heat treatment and surface engineering.

1.2. Course enrolment requirements

Attended course Materials II.

1.3. Expected course learning outcomes

Analyse the basic knowledge related to the heat treatment. Analyse the transformations and basic processes of heat treatment of steel. Analyse the basic processes of heat treatment of non-ferrous metals. Analyse the surface heat treatment processes of alloys. Analyse the processes of surface engineering. Define the processes of heat treatment and surface engineering on the basis of construction and technological requirements.

1.4. Course content

Heat treatment of steel: hardening, stress relief, tempering, normalizing. Surface hardening processes: induction (high frequency) hardening, flame hardening. Diffusion treatments: carburizing, nitriding, boronizing. Isothermal tempering of ductile iron. Heat treatment of non-ferrous metal alloys. Nitriding. Plasma carburising, ion carburising. Surface engineering processes. Chemical vapor deposition (CVD). Physical vapor deposition (PVD). Methods for the application of thin layers by spraying technologies: thermal, electric arc, plasma, explosion.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, homework preparation, preparation for participation in teaching, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation	0.5	Seminar paper		Experimental work	
Written exam	0.5	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	0.5	Report		Practice	
Portfolio		Homework	0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, homework, preparation for participation in teaching, sustained knowledge check (two mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Smoljan, B., Heat treatment of steel, gray and ductile iron castings, Zagreb: Hrvatsko društvo za toplinsku obradbu i inženjerstvo površina, Udžbenici Sveučilišta u Rijeci, 1999. (in Croatian)
Smoljan, B., Fundamentals of heat treatment of steel, Rijeka: Sveučilište u Rijeci, Pedagoški fakultet, 1997. (in Croatian)
Krumes, D., Heat treatment, Strojarski fakultet u Slavonskom Brodu, Slavonski Brod 2000. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Stupnišek, M., Cajner, F., Fundamentals of heat treatment of metals, Hrvatsko društvo za toplinsku obradbu, Zagreb, 1996. (in Croatian)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Smoljan, B., Heat treatment of steel, gray and ductile iron castings, Zagreb: Hrvatsko društvo za toplinsku obradbu i inženjerstvo površina, Udžbenici Sveučilišta u Rijeci, 1999. (in Croatian)	4	46
Smoljan, B., Fundamentals of heat treatment of steel, Rijeka: Sveučilište u Rijeci, Pedagoški fakultet, 1997. (in Croatian)	6	46
Krumes, D., Heat treatment, Strojarski fakultet u Slavonskom Brodu, Slavonski Brod 2000. (in Croatian)	1	46

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Professional Practice I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	-

1. COURSE DESCRIPTION

1.1. Course objectives

Student verifies and complements his own expertise, along with a comprehensive view of the work process.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Apply acquired knowledge and skills from studied courses professional content. Gain working process experience. Develop and further improve competence for solving specific professional engineering problems.

1.4. Course content

Industrial practice within Undergraduate University Study of Naval Architecture is carried out individually in work organization that is engaged in the student's field of study, and with activities in accordance with the Industrial Practice Rules and Study Program curriculum. Within such practice, student is familiarized with the corresponding jobs that are studied through programs of education, with the task of verifying and complementing their own expertise, along with a comprehensive view of the work process.

1.5. Teaching methods	☐ lectures ☐ seminars and workshops ☐ exercises ☐ long distance education ☒ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Conducting professional practice in duration of 15 working days, or 120 hours, and writing the corresponding report.

1.8. Evaluation of student's work

Course attendance		Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam		Essay		Research	
Project		Sustained knowledge check		Report	1	Practice	4
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Assesses and evaluates student work and dedication, and written report.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Quality Assurance	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

The course is designed to provide the student with basic knowledge in quality assurance topics. Through exercises students are introduced with practical application of several course objectives.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

To interpret the meaning and importance of quality assurance. Explain the basic concepts of quality assurance and quality control. Classify quality characteristics of products, processes and services. Quality cost analysis. Interpret basic requirements of ISO 9001 standard. Apply basic quality tools. Assess results of statistical process control. Analyse R%R of measurement system. Measure process reliability and select acceptance sampling.

1.4. Course content

Definitions of quality. Quality of products, processes and services. Quality costs. Pareto principle. Economical level of quality. Optimal quality. Quality inspection. Quality assurance. International quality standards ISO 9000. Quality management. Total quality. Planning for quality. Quality improvement. Quality engineering. Method and tools for quality assurance and improvement. Cause-and-effect relationships. Causes of quality variability. Statistical process control methods. Common probability distributions. Control charts. Specification limits and tolerances. Products and processes quality assessment methods. Demerit method. Quality of measurement system.Acceptance sampling. Reliability.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, active participation in the course, attendance at laboratory exercises, homework and independent learning.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	2	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Sustained knowledge check (three midterm exams) and final written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

Montgomery, D.C., Jennings, C. L., Pfund, M. E.: Managing, controlling, and improving quality, John Wiley & Sons Wiley,

2011.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Seaworthiness and Stability of the Ship	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	7
	Number of hours (L+E+S)	45+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Creating a foundation for independent and physically based understanding of buoyancy concepts, stability (static and dynamic), flooding, grounding, docking, launching and basic calculations in that regard.

1.2. Course enrolment requirements

Attended course Ship Hull Forms.

1.3. Expected course learning outcomes

Indicate weight, and describe the concepts of gravity, buoyancy and centre of gravity. Define a static balance of the vessel and specify and analyse the conditions of navigability. Define metacentric radius and metacentric height. Analyse the parameters of the diagrammatic sheet and list of non-dimensional diagrammatic sheet and trim diagrams. Identify and analyse the static stability (levers, moments). Specify and analyse the elements that affect the stability (free surface, wind, loading and unloading cargo, shape of form, ice, rotation). Identify and analyse the flooding concept and the statistical method of subdivision. Define the concept of dynamic stability (energy pathways). Indicate and describe the docking procedures, grounding, towing and launching. Analyse and compare the international rules and regulations of classification societies related to ship hydrostatics. Analyse computer processing of hydrostatics in exploitation.

1.4. Course content

Weight and center of gravity. The buoyancy and center of buoyancy. The static equilibrium of the vessel. Terms of navigability. Metacentric radius and metacentric height. Calculation methods of buoyancy. Calculation of surface water line features. Diagrammatic sheet. Dimensionless diagrammatic sheet. Trim diagrams. Static stability (transverse, longitudinal): initial, for higher angles, special cases of stability. Leverage and torque for static stability. Unit immersion and unit moment to change trim. The influence of the free surface stability. Influence of form on the metacentric curve. Unsinkability, immersion boundaries, water penetration, bulkhead rearrangement, metacentric curve, symmetric and asymmetric flooding. Dynamic stability (energy pathways). Docking, grounding-towing, launching. Flotation and stability in operation of the vessel: the impact of loading / unloading and / or transfer of cargo. Computer processing of hydrostatics in the project stage and exploitation (load master).

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attendance, exams, project.

1.8. Evaluation of student's work

Course attendance	3	Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam	1.5	Essay		Research	
Project	1	Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

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

1.10. Assigned reading (at the time of the submission of study programme proposal)

Uršić, J.: Ship Seaworthiness, script, Fakultet strojarstva i brodogradnje, Zagreb, 1991. (in Croatian)
Uršić, .J.: Ship Stability, part I i II, script, Fakultet strojarstva i brodogradnje, Zagreb, 1964. (in Croatian)
Moore, C. S.: Principles of Naval Architecture Series: Intact Stability. The Society of Naval Architects & Marine Engineers (www.sname.org), 2010.
Biran, A. B.: Ship hydrostatics and stability, 2006.

1.11. Optional / additional reading (at the time of proposing study programme)

Manual for the software program to create a marine form which is the subject to hydrostatics calculations (buoyancy, stability, flooding, etc.).
Parts of the regulations of classification societies: CRS (Croatian Register of Shipping).

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Uršić, J.: Ship Seaworthiness, script, Fakultet strojarstva i brodogradnje, Zagreb, 1991. (in Croatian)	4	18
Uršić, .J.: Ship Stability, part I i II, script, Fakultet strojarstva i brodogradnje, Zagreb, 1964. (in Croatian)	8	18
Moore, C. S.: Principles of Naval Architecture Series: Intact Stability. The Society of Naval Architects & Marine Engineers (www.sname.org), 2010	1	18
Biran, A. B.: Ship hydrostatics and stability, 2006.	1	18

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through a structured system of quality assurance of the Faculty.

Basic description		
Course title	Ship Equipment	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	45+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

In this course students receive a basic knowledge of the ships equipment , elements and outfitting systems related to defined learning outcomes.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Apply technical requirements, conventions, regulations and standards. Define and describe the equipment for anchoring, mooring and towing. Describe and distinguish between the rudder and steering gear. Describe and specify equipment for safety. Describe and specify the equipment to move, place and protect cargo. Describe and differentiate the hatches, hatches, covers, skylights, doors, windows and panes. Describe the equipment to move the crew and passengers. Distinguish gear wheel, navigation and communication, navigation lights and signalling devices. Deploy troops and equipment to describe the systems to protect troops. Describe and display elements and the performance of heating, ventilation and air conditioning. Describe and display elements and the performance of heating, ventilation and air conditioning. Describe and show ways of insulation and covering floors, walls and ceilings.

1.4. Course content

Technical requirements, conventions, regulations, standards. Equipment troops. Restraints troops. Equipment for cargo. Hatches and lids. Cargo doors. Equipment and devices for moving cargo. Special equipment to move the cargo. Equipment for stitching and protect cargo. Containers for cargo. Ventilation, insulation and cladding warehouses. Rescue equipment and safety. Funding for rescue. Equipment for fire protection. Equipment accommodation and special rooms. Isolation quarters. Partitions, doors, windows, windows and skylights. Deck coverings, walls and ceilings. Railings, bridges, ladders. Staircases, platforms, flooring, elevators. Furniture and other equipment. Tools and equipment for maintenance of working conditions on board. Arrangements for the stability of the ship. Equipment for steering, navigation and communication. Lights and signalling devices. Equipment for anchoring, mooring and towing. Equipment for the operation of the machines. Special equipment.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☒ fieldwork	☒ individual assignment ☐ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper	1	Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	2	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing (two mid-term exams), Seminar paper, written exam, oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Buxton, I. L., Cargo Access Equipment for Merchant Ships, MacGregor Publications Ltd., 2014.
House, D.J., Cargo Work, Elsevier Butterworth-Heinemann, Oxford, 2005.
House, D.J., Seamanship Techniques, Elsevier, 2005.

1.11. Optional / additional reading (at the time of proposing study programme)

Bosnić, A., Vukičević, M., Ship Equipment, Fakultet strojarstva i brodogradnje, Zagreb, 1983. (in Croatian)
Ozretić V., Ship Auxiliary Devices, Liburnija, Rijeka, 1996. (in Croatian)
Cowley, J., Fire Safety at Sea, MEP Series, Volume 1, Part 5. IMAREST, London, 2004.
Boisson, P., Safety at Sea, BV Paris, 1999.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Buxton, I. L., Cargo Access Equipment for Merchant Ships, MacGregor Publications Ltd., 2014.	2	20
House, D.J., Cargo Work, Elsevier Butterworth-Heinemann, Oxford, 2005.	2	20
House, D.J., Seamanship Techniques, Elsevier, 2005.	2	20

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Ship Hull Forms	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	30+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Developing a sense of spatial shaping of the vessels form. Creating a sense of the smoothness of ships lines and surfaces.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Describe and define a ship hull geometry for the displacement, semi-displacement ships and powerboats. Describe and distinguish between forms of special types of ships. Define and describe the geometric representation of ship form using ship lines. Define the basic dimensions of the ship and analyse and explain the coefficients of marine forms. Define the freeboard and its corrections, and describe and distinguish the markings on the hull of the ship. Distinguish and explain the numerical description of ship form using computer software. Define and describe the form of appendages. Analyse the similarity of marine forms and describe the variation of ship forms.

1.4. Course content

General information about the hull of ships and boats (review of technical requirements - the design and operation of the vessel). Ship geometry of displacement, semi-displacement ships and powerboats. Forms of special types of ships: ships underwater wings, SWATH vessels, air cushion, underwater objects, etc. Special forms of marine forms at the bow and stern. Forms of multihull boats. Geometric representation of ship form using ship lines (3D curved surfaces, 2D and 3D curves). Coefficients of marine forms. Dimensionless representation of marine forms. Numerical description of ship forms using computer software. Geometry of appendages (propeller, rudder, keel, bilge keel, planking, underwater wings, etc.). The similarities in vessels shape. Varying the ship hull.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attendance, exams, project.

1.8. Evaluation of student's work

Course attendance	2.5	Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam	1	Essay		Research	
Project	1	Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

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

1.10. Assigned reading (at the time of the submission of study programme proposal)

Bernardi, T.: Ship Lines (script), Fakultet strojarstva i brodogradnje, Zagreb, 1969. (in Croatian)
Furlan, Z., Lučin, N., Pavelić, A.: Basics of Shipbuilding, Školska knjiga, Zagreb, 1989. (in Croatian)

Letcher, J.: Principles of Naval Architecture Series: The Geometry of Ships The Society of Naval Architects & Marine Engineers (www.sname.org), 2009
Grubišić I.: Ship Geometry, Digital script.

1.11. Optional / additional reading (at the time of proposing study programme)

Classification society rules: HRB, especially regarding the definition of the basic dimensions, concepts and expressions and section to explain freeboard of the ship.
Manual for the software program to create 3D marine forms.
Biran, A. B.: Ship hydrostatics and stability, 2006.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Bernardi, T.: Ship Lines (script), Fakultet strojarstva i brodogradnje, Zagreb, 1969. (in Croatian)	9	19
Furlan, Z., Lučin, N., Pavelić, A.: Basics of Shipbuilding, Školska knjiga, Zagreb, 1989. (in Croatian)	10	19
Letcher, J.: Principles of Naval Architecture Series: The Geometry of Ships The Society of Naval Architects & Marine Engineers (www.sname.org), 2009	1	19

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through a structured system of quality assurance of the Faculty.

Basic description		
Course title	Ship Structure I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	45+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Within the course students will gather basic knowledge about structural elements of displacement single hull ship with significant dimension in length, suitable for carrying commercial cargo and for ocean service.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Specify and properly interpreted the type of ship structural load. Distinguish materials for the hull construction by mechanical characteristics. Define the purpose and phases of the ship longitudinal strength calculation. Compare the basic features of the transversal, longitudinal and mixed system of hull construction. Enumerate specific structural hull units and define their functions. Enumerate specific structural elements within the structural unit and explain ways of connection. Distinguish between primary and secondary elements of ship structure. Identify and define the parameters necessary for the dimensioning of a structural element (primary or secondary). Outline solutions of certain marine structural units for different types of merchant ships. Apply the rules and regulations of classification societies to define the criteria for dimensioning of ship hull structure elements.

1.4. Course content

Introduction in marine structures. Ship types development and development of application of construction materials; steel and aluminum. Review of the load and structural principles according to strength basics and modes of loading. Fundamentals in the ship longitudinal strength calculation. Plates and profiles as basic construction parts of ship structure. Basic characteristics of longitudinal, transversal and mixed hull construction system. Basic ship hull structural elements. Keel and stems. Single bottom elements. Double bottom elements. Double bottom in engine room, engine seats. Shell, frames, web frames, longitudinals, stringers. Deck, deck beams, longitudinal under deck girder, pillars. Openings in deck, hatch, hatch covers and hatch coamings. Bulkhead, structural tanks, Superstructure and deckhouses.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, homework, studying

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam	1	Essay		Research	
Project	0.5	Sustained knowledge check	2.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing (two mid-term exams), project work, written and oral exam

1.10. Assigned reading (at the time of the submission of study programme proposal)

Zamarin, A.: Ship Construction I, internal script, available over web page of the Chair for construction of floating objects. (in Croatian)
Eyres, D.J.: Ship Construction, Butterworth-Heinemann, Oxford 1994.
Grubišić, M.: Ship Structures, Viša pomorska škola – Split, 1974. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Taggart, R.: Ships Design and Construction, SNAME, New York 1980.
..., Rules and Regulations; IACS-CSR, LR, DNV, ABS, BV, GL, HRB.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Zamarin, A.: Ship Construction I, internal script, available over web page of the Chair for construction of floating objects. (in Croatian)	12	12
Eyres, D.J.: Ship Construction, Butterworth-Heinemann, Oxford 1994.	2	12
Grubišić, M.: Ship Structures, Viša pomorska škola – Split, 1974. (in Croatian)	1	12

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Ship Structure II	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	15+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge in the field of structural elements of displacement single hull ship with significant dimension in length. Develop skills to solve practical problems within empirical approach in scantling determination.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Specify particularities of structures in the area of the bow and stern. Describe the importance of continuity of structural elements (on specific structural units). Apply the rules and regulations of classification societies in the dimensioning of ship hull structure elements. Calculate the structural dimensions on some position of a merchant type ship under the rules and regulations of a classification society. Analyze the calculation results in respect to the criteria for dimensioning by classification societies. Link individual structural elements in a functional unit. Analyze the different topology solutions of basic structure. List the capabilities of modern software for structure design, scantlings check and development of technical documentation.

1.4. Course content

Rules and regulations of classification societies, nomenclature and application. Dimensioning of elements of the structure of the double bottom, outer shell, decks, bulkheads, pillars and superstructure. The structure relationship to molded lines. The matching and continuity of structural elements. The choice of topology for midship construction. Elements of the construction of the bow and stern. Rudder, struts and boss. Special reinforcements of ship structures. Specificity and choice of design solutions in the area of cargo space, engine room, bow and aft peak. Possibilities of software application in scantling determination and the development of technical documentation.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, activity, homework, studying

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam	0.5	Essay		Research	
Project	2.5	Sustained knowledge check	1	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, continuous knowledge testing (one mid-term exams), project work, written and oral exam

1.10. Assigned reading (at the time of the submission of study programme proposal)

Zamarin, A.:Ship Construction II, internal script, aviliable over web page of the Chair for construction of floating objects. (in Croatian)

Eyres, D.J.: Ship Construction, Butterworth-Heinemann, Oxford 1994.
Grubišić, M.: Ship Structures, Viša pomorska škola – Split, 1974. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Taggart, R.: Ships Design and Construction, SNAME, New York 1980.
..., Rules and Regulations; IACS-CSR, LR, DNV, ABS, BV, GL, HRB.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Zamarin, A.:Ship Construction II, internal script. (in Croatian)	12	12
Eyres, D.J.: Ship Construction, Butterworth-Heinemann, Oxford 1994	2	12
Grubišić, M.: Ship Structures, Viša pomorska škola – Split, 1974. (in Croatian)	1	12

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Shipbuilding Technology	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Students gain basic knowledge about ship production, ship launching process and relevant documentation according to defined learning outcomes.

1.2. Course enrolment requirements

Attended course Basics of Ship Production

1.3. Expected course learning outcomes

Classification and differentiation between various types of ship and other offshore objects building berths.. Explain and analyze building berth preparation works for ship construction. Describe contemporary methods of building berth ship erection, order of ship erection and outfitting. Analyze and describe activities for joining and welding ship blocks on the building berth, and automation of such activities. Define and describe the procedures for inspecting and testing of hull construction. Analyze and compare the systems of ship launching or vice versa. Define and describe the process of ship launching. Analyze and describe the design and layout of ship supporting blocks, rake pillars, launching triggers, sliding ways and ground ways. Analyze and define longitudinally launching.

1.4. Course content

Berths for ship errection. Berths equipment. Berth preparation for ship construction. Ship positioning at the berth. Modern shipbuilding methods, errection time schedule and consequent outfitting. Ship blocks joining at the berth. Automation of assembly works. Hull construction inspection and testing. Systems for ship launching. Comparative analysis of launching systems. Launching process. Construction and arrangement of slipway blocks, rake pillars, launching triggers, sliding ways and ground ways. Mechanics of longitudinal launching.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☒ fieldwork	☒ individual assignment ☐ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Course attendance, sustained knowledge check, seminar paper.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper	1	Experimental work	
Written exam	1.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, sustained knowledge check (two mid-term exams), seminar paper, written and oral exam or their combination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Storch, R. L. at al: Ship Production, 2nd edition, SNAME, 2007.
Furlan, Z. i dr.: Shipbuilding Technology, Školska knjiga, Zagreb, 1986. (in Croatian)
Lamb, T., at all: A Review of Technology Development. SNAME, Transactions, Vol. 103, 1995.

1.11. Optional / additional reading (at the time of proposing study programme)

Wiebeck, E., Beyrodt, M., Winkler, Z.: Technologie des Schiffskorperbaus, VEB Verlag Technik, Berlin, 1980.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Storch, R. L. at al: Ship Production, 2nd edition, SNAME, 2007.	2	16
Furlan, Z. i dr.: Shipbuilding Technology, Školska knjiga, Zagreb, 1986. (in Croatian)	10	16
Lamb, T., at all: A Review of Technology Development. SNAME, Transactions, Vol. 103, 1995.	2	16

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Small Craft Building and Maintenance UN	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

The acquisition of specific competencies dealing with the small craft building and maintenance. Acquiring the skills of independent work and developing the ability to present the achieved results.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Distinguish materials for the building of small crafts. Describe the methods for building small crafts of wood and wooden materials, plastics and metals. Describe the installation of propulsion engine with associated systems. Describe the work on the interior and exterior outfitting of small crafts. Describe the works on maintenance and repair of small crafts. Describe the places for building, maintenance and winter storage of small crafts and facilities for retrieving, lifting/launching and hauling of small crafts.

1.4. Course content

Materials for building the small crafts: wood, wooden laminate, single-skin FRP laminate, cored FRP laminate, steel, aluminum alloys, other materials. Durability and protection of materials. Building of traditional wooden small crafts. Building of plywood small crafts. Building of small crafts using the WEST technique. Building of FRP small crafts. Building of steel small crafts. Building of aluminum small crafts. Building small crafts of other materials. Installation of engines and related systems. Small craft interior and exterior outfitting. Rigging and sails outfitting of sailing boat. Maintenance and repair of small crafts. Places for building, maintenance and winter storage of small crafts. Facilities for retrieving, lifting/launching and hauling of small crafts.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☒ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments		

1.7. Student's obligations

Attendance at lectures, seminar work with presentation, self learning.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper	2	Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check		Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Attendance at lectures, seminar work with presentation, written examination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

du Plessis, H.: Fibreglass Boats, International Marine, Camden, 1996.
..., The Gougeon Brothers on Boat Construction-Wood and WEST System Materials, The McKay Press, Inc., Midland, 1985.

Pollard, S.F., Boatbuilding with Aluminum, International Marine, Camden, 1993.

1.11. Optional / additional reading (at the time of proposing study programme)

Calder, N. *Boatowner's Mechanical and Electrical Manual*, International Marine, Camden, 1996.
Warren, N., *Metal Corrosion in Boats*, Adlard Coles Nautical, London, 1998.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
du Plessis, H.: Fibreglass Boats, International Marine, Camden, 1996.	1	19
..., The Gougeon Brothers on Boat Construction-Wood and WEST System Materials, The McKay Press, Inc., Midland, 1985.	1	19
Pollard, S.F., Boatbuilding with Aluminum, International Marine, Camden, 1993.	1	19

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Statics	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1	
ECTS credits and teaching	ECTS student 's workload coefficient	6
	Number of hours (L+E+S)	45+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills to solve practical problems in the field of statics.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Define force, moment for a point and an axis, couple of forces and resultant of a force system. Define various types of loads. Solve problem of system of forces in a plane: colinear, concurrent and general systems. To simplify system of forces in a plane. Determine equilibrium conditions in a plane. Decomposition of forces in a plane. Solve forces systems in space: concurrent, parallel and general systems. To simplify system of forces in space. Determine equilibrium conditions in space. Determine the central axis of force system in space. Determine static invariants. Determine centroids of lines, areas and bodies. Apply Pappus-Guldin theorems. Define various types of beams, possible loads and internal forces. To solve trusses. To solve beams: equilibrium, internal forces diagrams. To solve frames: equilibrium, internal forces diagrams. Solve problems that include sliding and rolling friction. To solve cable problems.

1.4. Course content

Introduction. Colinear, concurrent, parallel and general system of forces in a plane. Determination of resultant of forces and equilibrium conditions. Moment of a force about a point. Varignon's theorem. Couple of forces and properties. Separation of a force into three components. Concurrent, parallel and arbitrary system of forces in a space. Determination of resultant of forces and equilibrium conditions. Separation of force into three noncoplanar components. Moment of a force about a given axis. Reduction of arbitrary spatial system of forces. Axis of wrench. Static invariants of spatial system of forces. Centres of gravity: lines, surfaces, bodies. Pappus-Guldin theorems. Types of equilibrium. Structures: trusses, beams and frames. Sliding friction and rolling friction. Cables.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☒ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio		Homework	0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, homework, continuous knowledge testing (three mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Brnić, J.: "Statics", Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 2004. (in Croatian)
Brnić, J.: "Mechanics and structural elements ", Školska knjiga, Zagreb, 1996. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

Matejiček, F., Semenski, D., Vnučec, Z.: "Introduction to Statics", Golden Marketing, Zagreb, 1999.(in Croatian)
Beer, F. P., Johnston, E.R., Eisenberg, E.R.:"Vector Mechanics for Engineers: Statics", McGraw-Hill, 2003.
Das, M. B., Kasimali, A., Sami, S.: "Engineering Mechanics, Statics", Irwin, Boston, 1994.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Brnić, J.: "Statics", Sveučilište u Rijeci, Tehnički fakultet, Rijeka, 2004. (in Croatian)	12	67
Brnić, J.: "Mechanics and structural elements", Školska knjiga, Zagreb, 1996. (in Croatian)	14	67

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Strength of Materials	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	1	
ECTS credits and teaching	ECTS student 's workload coefficient	7
	Number of hours (L+E+S)	45+45+0

1. COURSE DESCRIPTION

1.1. Course objectives

Developing knowledge and skills for autonomous stress/strain analyses and determining dimensions and materials of loaded structures and their components.

1.2. Course enrolment requirements

Basic knowledge of statics of rigid bodies.

1.3. Expected course learning outcomes

Define basic assumptions and terms in solid mechanics. Define strain and stress. Determine extreme stress values. Differentiate simple and compound stress states. Define Hooke's law. Differentiate simple and compound loading cases. Calculate strains and stresses at axial loading, shear and torsion. Calculate cross-section properties. Calculate strains and stresses at bending of beams. Define deflection lines of beams. Explain three-moment equation for continuous beams. Determine and analyse distribution of internal forces at continuous beams. Calculate critical buckling loads of columns. Calculate strains and stresses at compound loadings.

1.4. Course content

Strain. Stress. Hooke's law. Axial loading. Shear. Torsion. Cross-section properties.Theories of failure. Bending of beams. Deflection curves. Buckling of columns. Continuous beams. Compound loadings.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☒ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, laboratory exercises, final exam, self-studying.

1.8. Evaluation of student's work

Course attendance	3	Activity/Participation		Seminar paper		Experimental work	0.5
Written exam	1	Oral exam	0.5	Essay		Research	
Project		Sustained knowledge check	2	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Continuous knowledge testing. Written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Brnić, J., Turkalj, G.: "Strength of Materials I" University of Rijeka, Faculty of Engineering, 2004. (in Croatian),
Brnić, J., Turkalj, G.: "Strength of Materials II" Zigo, Rijeka, 2006. (in Croatian),

1.11. Optional / additional reading (at the time of proposing study programme)

Alfirević, I.: "Strength of Materials I", Tehnička knjiga, Zagreb, 1995. (in Croatian)
Šimić, V.: "Strength of Materials I", Školska knjiga, Zagreb, 1992. (in Croatian)
Gross, D., Hauger, W., Schröder, J., Wall, W.A., Bonet, J.: "Engineering Mechanics 2", Springer, 2011.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course		
Title	*Number of copies*	*Number of students*
Brnić, J., Turkalj, G.: "Strength of Materials I",University of Rijeka, Faculty of Engineering, Rijeka, 2004. (in Croatian)	15	24
Brnić, J., Turkalj, G.: "Strength of Materials II", Zigo, Rijeka, 2006. (in Croatian)	7	24

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences
Through the Institution's quality assurance system.

Basic description		
Course title	System Modelling and Simulation	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Mastering the methods and techniques of mathematical modelling and computer simulation of various technical processes. Modelling technical systems analogous to electrical systems.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Adopt the basic principles of creating mathematical models of various technical systems (mechanical, thermal, electrical, fluid flow system, etc.). Master basic use of Matlab / Simulink simulation software for model creation, simulation and system analysis. Transform the mathematical model of the system into a graphical representation using block diagrams. Display systems in the state space from the differential equation description, transfer function and block diagram description. Linearize nonlinear equations using Taylor series. Simulate different technical systems using electrical networks with operational amplifiers. Generate analytic functions by using the power series and solving differential equations.

1.4. Course content

The types and properties of the models. Methods of determining the mathematical models of the systems. Description of the systems by using differential equations, transfer functions and state-space models. Modelling systems with distributed parameters. Determination of models using physical laws. Complex and simplified models of elements. Modelling systems with distributed parameters. Simulations of systems. Numerical integration methods for systems' simulations. Generation of nonlinear and analytical functions. The simulation software packages.

1.5. Teaching methods	☒ lectures ☐ seminars and workshops ☒ exercises ☐ long distance education ☐ fieldwork	☐ individual assignment ☐ multimedia and network ☐ laboratories ☐ mentorship ☐ other
1.6. Comments	-	

1.7. Student's obligations

Course attendance, work on laboratory exercises, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	1
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	1	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, work on laboratory exercises, continuous knowledge testing (three mid-term exams), written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

D.J. Cloud: Applied Modelling and Simulation: An Integrated Approach to Development and Operation, McGraw-Hill, 1998.
N.M.Karayanakis: Advanced System Modelling and Simulation With Block Diagram Languages, CRS Press, 1995.

1.11. Optional / additional reading (at the time of proposing study programme)

A. Cavallo, R. Sctola, F. Vasca: Using Matlab, Simulink and Control System Tool Box: A Practical Approach, Prentice Hall, 1996.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
D.J. Cloud: Applied Modelling and Simulation: An Integrated Approach to Development and Operation	-	50
N.M.Karayanakis: Advanced System Modelling and Simulation With Block Diagram Languages	-	50

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Technology Processes of Shipbuilding	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	optional	
Year	3.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

Introduction to technological processes in shipbuilding, capabilities and techniques of management and organization of preparatory and shipbuilding production processes, and the importance of planning the integration of various processes in shipbuilding, according to defined learning outcomes.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Interpret organizational features of shipbuilding processes of preparation and production. Distinguish between various shipyard processes modelling capabilities. Describe the shipbuilding processes and working areas. Interpret shipyard flexibility. To analyze the structural and technological constraints. Define the shipyard throughput. Interpret and explain the characteristics of the ship assembly process. Describe transport techniques, systems and shipyard equipment. Argue the integration of ship production processes. Analyze delivery procedures throughout production phases.

1.4. Course content

Organizational features of shipbuilding processes of preparation, production and repair. Requirements, divisions and capabilities for modeling shipyard processes. Shipbuilding processes and working areas. Shipyard flexibility. Structural and technological constraints of the processes. Classification and characteristics of the processes. The preparative process. The integration of informations flow. Production processes. Throughput of processes. Characteristics of assembly process. Transport techniques, systems and equipment. The mechanization for assembly process. Process management concepts. The integration of ship production process. Control of resources, material flow, dokumentation. Quality control, delivery procedures throughout production phases, the finalization of the production processes.

1.5. Teaching methods		
	☒ lectures	☐ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, sustained knowledge check, studying.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	1	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio							

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, sustained knowledge check (two mid-term exams), written and oral exam or their combination.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Furlan, Z. i dr.: Shipbuilding Technology, Školska knjiga, Zagreb, 1986. (in Croatian)
Lamb, T., at all: A Review of Technology Development. SNAME, Transactions, Vol. 103, 1995.

1.11. Optional / additional reading (at the time of proposing study programme)		
Storch, R. L. et al: Ship Production, SNAME, New Jersey, 1995.		
1.12. Number of assigned reading copies with regard to the number of students currently attending the course		
Furlan, Z. i dr.: Shipbuilding Technology, Školska knjiga, Zagreb, 1986. (in Croatian)	10	5
Lamb, T., at all: A Review of Technology Development. SNAME, Transactions, Vol. 103, 1995.	2	5
1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences		
Through the Institution's quality assurance system.		

Basic description		
Course title	Thermodynamics NA	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	5
	Number of hours (L+E+S)	30+30+0

1. COURSE DESCRIPTION

1.1. Course objectives

Obtaining theoretical knowledge and develop skills to solve practical problems in the field of thermodynamics. Acquiring the knowledge required for attending lectures in the field of thermal and energy engineering.

1.2. Course enrolment requirements

Attended courses Mathematics I and Mathematics II.

1.3. Expected course learning outcomes

Define and describe the first and second laws of thermodynamics as well as the concept of thermal conditions. Define and describe the equation of state of an ideal gas and gas mixtures. Describe the ideal gas state changes. Describe and compare the thermal cycles. Compare and analyze the reversible and irreversible processes and define work losses due to the irreversibility. Describe state changes during evaporation and condensation. Describe, compare and analyze processes of steam plants. Describe and analyze the thermal behaviour during combustion. Describe and compare the processes of internal combustion engines. Describe and analyze the exchange of energy in the flow through the nozzle. Define, describe and compare basic types of heat transfer and describe the heat transfer within the heat exchanger. Describe and analyze the changes and processes with humid air. Apply acquired knowledge to solve thermodynamic tasks (practical problems).

1.4. Course content

The historical development of energy use. Thermal state. The first law of thermodynamics. Ideal and real gas. Equation of state. Work and pV-diagram. Specific heat capacity. Gas mixtures. Ideal gas state changes. Thermodynamic cycles. Carnot cycle. Reversible and irreversible processes. Irreversibility, entropy and work. The second law of thermodynamics. Technical work. Maximum work. Damping. Enthalpy. Mixing of gases irreversibility. Losses due to the irreversibility. Evaporation and condensation. The heat exchange during evaporation. State changes of saturated steam. Superheated steam. Processes of steam plants. Mollier hs-diagram. Exergy. Combustion. Thermal phenomena during combustion. Processes of internal combustion engines. Energy exchange in the flow. De Laval nozzle. Basic types of heat transfer. Heat conduction. Heat transfer by convection. Heat transfer by radiation. Overall heat transfer coefficient. Heat exchangers. Humid air. Mollier hx-diagram.

1.5. Teaching methods		
	☒ lectures	☒ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☐ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, activity, homework, studying.

1.8. Evaluation of student's work

Course attendance	2	Activity/Participation		Seminar paper		Experimental work	
Written exam		Oral exam	1	Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio		Homework	0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Course attendance, activity, homework, continuous knowledge testing (three mid-term exams), written and oral exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

Bošnjaković, F.: Thermodynamics, Vol. I, II and III (reprint editions of 1978, 1976 and 1986), Graphis d.o.o., Zagreb, 2012. (in Croatian)
Halasz, B, Galović, A., Tadić, M.: Collections of exercises in Thermodynamics, part I, part II, Sveučilišna tiskara, Zagreb, 1993. and 1996. (in Croatian)

1.11. Optional / additional reading (at the time of proposing study programme)

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

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*
Bošnjaković, F.: Thermodynamics, Vol. I, II and III (reprint editions of 1978, 1976 and 1986), Graphis d.o.o., Zagreb, 2012. (in Croatian)	38	19
Halasz, B, Galović, A., Tadić, M.: Collections of exercises in Thermodynamics, part I, part II, Sveučilišna tiskara, Zagreb, 1993. and 1996. (in Croatian)	19	19

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.

Basic description		
Course title	Welding Engineering I	
Study programme	Undergraduate University Study of Naval Architecture	
Course status	compulsory	
Year	2.	
ECTS credits and teaching	ECTS student 's workload coefficient	4
	Number of hours (L+E+S)	30+15+0

1. COURSE DESCRIPTION

1.1. Course objectives

The course is designed to provide the student with basic knowledge in welding engineering topics. Student is introduced with practical application of several welding processes.

1.2. Course enrolment requirements

None.

1.3. Expected course learning outcomes

Describe the basic welding processes and classify welding power sources. Interpret characteristics of arc and mechanisms of formation of the welded joint. Explain weldability and describe the specifics of welding alloy steel, cast iron, aluminum and copper alloys. Classify welding consumables and types of welds. Calculate power requirements for welding and consumption of welding consumables for arch welding. Classify errors in welding and describe methods for quality assurance of welding.

1.4. Course content

Historical development of welding processes. Pressure welding processes. Fusion welding processes. Arc welding. Arc characteristics. Heat input. Static characteristic of an electric arc. Classification of power sources. Welding parameters. Power source equipment. Welding metallurgy. Metal transfer in arc welding. Microstructure of welded joints. Heat affected zone. Weldability. Welding cracks. Preheating. Alloys welding. Design of welded joints. Terms and definitions. Welding symbols. Welding consumables. Classification, characteristics and designation of covered electrodes. Electrodes selection. Energy consumption. Productivity indices. Quality of welds. Welds imperfections. Inspections of welds. Welding procedures.

1.5. Teaching methods		
	☒ lectures	☐ individual assignment
	☐ seminars and workshops	☐ multimedia and network
	☒ exercises	☐ laboratories
	☐ long distance education	☐ mentorship
	☒ fieldwork	☐ other

1.6. Comments

1.7. Student's obligations

Course attendance, active participation in the course, attendance at on-site training, homework and independent learning.

1.8. Evaluation of student's work

Course attendance	1.5	Activity/Participation		Seminar paper		Experimental work	
Written exam	0.5	Oral exam		Essay		Research	
Project		Sustained knowledge check	1.5	Report		Practice	
Portfolio			0.5				

1.9. Assessment and evaluation of student's work during classes and on final exam

Sustained knowledge check (three midterm exams) and final written exam.

1.10. Assigned reading (at the time of the submission of study programme proposal)

1.11. Optional / additional reading (at the time of proposing study programme)

Connor, L.P., ed.: *Welding Handbook, Vol. 1, Welding Technology*, AWS, Miami, 1989.
O'Brien, R.L., ed.: *Welding Handbook, Vol. 2, Welding Processes*, AWS, Miami, 1991.

1.12. Number of assigned reading copies with regard to the number of students currently attending the course

Title	*Number of copies*	*Number of students*

1.13. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences

Through the Institution's quality assurance system.