



Erasmus+



Maritime University of Szczecin

Courses in English for Erasmus Students

General Subjects

academic year 2026/2027

winter and summer semester

Szczecin 2026

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	Type of the subjects	Name of the subject	ECTS	Code	Semester
1	GENERAL	INTRODUCTION TO MARITIME SOCIOLOGY	1	FN	SUMMER SEMESTER
2	GENERAL	PSYCHOLOGY OF HUMAN BEHAVIOUR (	1	FN	WINTER SEMESTER
3	GENERAL	HEALTH AND SAFETY ON SHIPS	1	FN	WINTER SEMESTER
4	GENERAL	INFORMATION TECHNOLOGIES semester 1	1	FN	WINTER SEMESTER
5	GENERAL	INFORMATION TECHNOLOGIES semester 2	1	FN	SUMMER SEMESTER
6	GENERAL	MATHEMATICS semester 1	7	FN	WINTER SEMESTER
7	GENERAL	MATHEMATICS semester 2	7	FN	SUMMER SEMESTER
8	GENERAL	MATHEMATICS semester 3	7	FN	WINTER SEMESTER
9	GENERAL	PHYSICS semester 1	3	FN	WINTER SEMESTER
10	GENERAL	PHYSICS semester 2	5	FN	SUMMER SEMESTER
11	GENERAL	CHEMISTRY	2	FN	WINTER SEMESTER
12	GENERAL	COMPUTER SCIENCE semester 1	2	FN	WINTER SEMESTER
13	GENERAL	COMPUTER SCIENCE semester 2	2	FN	SUMMER SEMESTER
15	GENERAL	AUTOMATION semester 5	2	F N	WINTER SEMESTER

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15	GENERAL	ELECTRICAL AND ELECTRONIC ENGINEERING semester 2	2	FN	SUMMER SEMESTER
16	GENERAL	MACHINE CONSTRUCTION AND ENGINEERING GRAPHICS semester 1	3	FN	WINTER SEMESTER
17	GENERAL	TRANSPORT SYSTEMS	1	FN	WINTER SEMESTER
18	GENERAL	FUNDAMENTALS TO Economics	1	FN	SUMMER SEMESTER
19	GENERAL	Ergonomics	1	FN	SUMMER SEMESTER
20	GENERAL	Electronics and Electrotechnology semester 3	2	FN	WINTER SEMESTER
21	GENERAL	Port Infrastructure	1	FN	WINTER SEMESTER

GENERAL SUBJECTS

INTRODUCTION TO MARITIME SOCIOLOGY	
Semester	summer semester
Number of ECTS	1
Number of classes	LECTURE 15h
Description	1. Sociology as a scientific discipline. Diversity of research aims in sociology. Characteristics of research methods in sociology: experiment, questionnaires and polls, observation, historical research. 2. Major related, economic and cultural bases of social life. Social inequalities. Inequality in access to economic resources. Influence of the social environment on an individual. 3. Race, nationality, nation: discrimination and ethnic prejudice. Characteristics of basic symbolic systems in society: language, systems of values, belief systems, systems of norms and knowledge resources. Cultural differences and prejudices. 4. Globalization and its international determinants. Social dimension of globalization in maritime economy. Leadership and Teamwork; Human Element, Leadership and Management (HELM) – STCW 2010, Manila Amendments 5. Working environment and life on a ship. Specifics of seafarer's and fisherman's jobs. Conditions of work at sea. Ship as an enclosed institution. 6. Intercultural communication at work at sea. Awareness of cultural difference, inborn traits, attitudes, behavior and intercultural interactions. 7. Types (and kinds) of social bonds. Social bonds on a ship. Ship's crew as a small integrated social group. Informal social structures on a ship. 8. Sociological aspects of managing and conning a sea-going ship, team work. 9. Professional preparation for work at sea. Job adaptation of seaman and fisherman. Motivations and needs of a seafarer on a ship versus stress and job adaptation. 10. Psychosocial factors of occupational accidents of seamen and fishermen. Human error, situational awareness. Awareness of automation of performed actions. 11. Specifics of seamen and fishermen jobs and their social consequences in life on land, including family life. 12. Influence of work at sea on personality. Free time of seamen and fishermen. Complacency, boredom.

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PSYCHOLOGY OF HUMAN BEHAVIOUR	
Semester	Winter semester
Number of ECTS	1
Number of classes	LECTURE 15
Description	I. Course unit aims Presentation of fundamentals of psychology, sociology and ergonomics. Imparting skills of observation and analysis of various social and sociological processes. Understanding the need of better functioning in the social environment to avoid unnecessary problems. Preparation of the future graduate for work where basic psychological concepts of human being are applicable (psychoanalysis, behaviourism, human psychology).

HEALTH AND SAFETY ON SHIPS	
Semester	Winter semester
Number of ECTS	1
Number of classes	LECTURE 15
Description	I. This course unit aim is to impart knowledge of basic occupational safety principles observed on board a ship and the influence of all external factors posing risks to personnel working onboard; to make students aware of risks and hazards related with work on a sea-going ship.

INFORMATION TECHNOLOGY –semester 1	
Semester	Winter semester
Number of ECTS	1
Number of classes	LECTURE 15h
Description	1. Sources of information – quantity of information, coding, compression, decompression, archiving of information. 2. Means and standards of communicating information. Formats of data. 3. Standards of data transmission. Solutions used in data transmission. Methods of sound transmission. Methods of image transmission. 4. The subject and methods of information technology. Basic concepts. 5. Information society: knowledge society, digital world, digitized documents, systems of document circulation. 6. Hardware. Classification of hardware. Representation of data in computer systems. Hardware classification. 7. Hardware items. 8. Computer networks. The Internet. Network services. 9. System software. 10. User software. Programming – phases of programming. 11. Programming and its phases. 12. IT systems. Structure of IT system creation process. 13. IT applications in the maritime economy.

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	14. Selected legal issues: copyright, data security. 15. Development trends in information technology.
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INFORMATION TECHNOLOGY –semester 2	
Semester	Winter semester
Number of ECTS	1
Number of classes	LECTURE 15h
Description	1. Algorithms. Design and analysis of algorithms. Block diagram. 2. Program structure (VBA, Delphi, C, Java, VB), edition, compilation, activating a program. Program debugging. Input/ output instructions. Types of data, structures of data, variables, assignment statements. Arithmetic and logical terms. 3. Conditional and selection instructions, iterative instructions, index variables. 4. Procedures and functions. Functions and recurrent algorithms. Files. Operations on files. 5. Elementary examples of algorithms. 6. Selected legal issues. 7. Data security. 8. Applications of information technology in the maritime economy. 9. Selected problems of artificial intelligence. 10. Development trends in information technology.

MATHEMATICS– semester 1	
Semester	Winter semester
Number of ECTS	7
Number of classes	LECTURE 15h + CLASSES 30h
Description	1. Differential calculus of single real variable function: supplementary knowledge of cyclometric functions, limits of sequences and functions, function derivative and differential, derivatives and differentials of higher orders, theorems on mean value, Taylor formula, monotonicity, extremes, convexity and concavity, points of inflexion, asymptotes, de l'Hospital rules, investigation of a behaviour of a function. 2. Integral calculus of single real variable function: indefinite integral, fundamental integration methods and theorems, integration of rational, irrational and trigonometric functions, definite integral (Riemann's definition), fundamental theorems and properties of definite integral, Newton-Leibnitz theorem, improper integrals, use of definite integral in geometry. 3. Differential and integral calculus of multi-variable function: definition of two-variable function, boundary and continuity of two-variable function, partial derivatives, derivatives of the composite function, exact differential, partial derivatives and exact differentials of higher orders, Taylor formula, multi-variable function extremes, definition and properties of double inte-

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	gral and triple integral, reduction of multiple integrals to iterated integrals, curvilinear directed and undirected integrals, Green's theorem
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MATHEMATICS– semester 2	
Semester	summer semester
Number of ECTS	7
Number of classes	LECTURE 15h + CLASSES 30h
Description	1. Matrices and determinants: definition and types of matrix, operation on matrices, definition and properties of determinants, rank of a matrix, inverse matrix. 2. Systems of linear equations, Cramer's formulas, matrix method, Kronecker – Capelli theorem. 3. Set of complex numbers, definition of complex number, Cartesian and trigonometric form of complex number, de Moivre formula, operations on complex numbers. 4. Analytical geometry in R^3 space: vector calculus, plane and line equations, surfaces of second order. 5. Series of numbers and functions: definition of a series of numbers, criteria of convergence of series with non-negative terms, alternating series, conditionally and absolutely convergent series of numbers, functional sequences and series, convergence and uniform convergence of a series and functional series, power series, Taylor series.

MATHEMATICS– semester 3	
Semester	Winter semester
Number of ECTS	7 ECTS
Number of classes	LECTURE 15h+ CLASSES 15h
Description	1. Ordinary differential equations: selected types of first order equations, selected types of second order differential equations: particular cases, linear differential equations of second order with constant coefficients; 2. Probability calculus: elementary events, random events, definition of probability, properties of probability, conditional probability, independence of random events, Bernoulli scheme, total probability, Bayes formula, random variables, probability distributions of random variables, parameters of random variables, 2D discrete and continuous random variables, covariance, correlation coefficients, correlated random variables, independence of random variables. 3. Fundamentals of mathematical statistics: basic terms and theorems, some probability distributions occurring in mathematical statistics, estimators, confidence intervals, statistical hypotheses and their verification, statistical tests.

PHYSICS – semester 1	
Semester	Winter semester
Number of ECTS	3
Number of classes	LECTURE 30h
Description	MECHANICS 1. Physical quantities: scalars and vectors. Fundamentals of vector calculus, operations on vectors. 2. Kinematics and dynamics of a material point. 3. Newton's principles of dynamics. Newton's universal law of gravitation. Fundamental forces in mechanics. 4. Energy conservation. Elastic and inelastic collisions of bodies. 5. Kinematics and dynamics of rigid bodies in progressive and rotational motion. 6. Kepler's laws. FLUID MECHANICS 7. Fluids, density and pressure. Pressure measurement, units. Static properties of fluids. 8. Hydrostatics. Pascal's law and hydraulic systems. 9. Archimedes' law and buoyancy force. Relationship between weight and volume of a body. Centre of buoyancy. Equation of gravity and buoyancy force. Conditions of equilibrium, mutual position of the centre of gravity and the centre of buoyancy. 10. Hydrodynamics. Continuity equation of a jet. Bernoulli's equation for steady flow, examples. 11. Hydrodynamic buoyancy resulting from progressive movement of a body on a water surface. 12. Perfect liquid, real liquid. Viscosity and turbulence. THERMODYNAMICS 13. Basic concepts and principles of thermodynamics. VIBRATIONS AND WAVES WITH ELEMENTS OF ACOUSTIC 14. Harmonic motion. Comparison of harmonic motion with uniform motion in a circle. 15. Simple and damped harmonic oscillations. Forced vibration. 16. Wave motion. Parameters describing waves. Reflection and refraction. Diffraction and interfer-

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	ence. Standing waves and resonance. 17. Sound waves. Speed and intensity of sound. Doppler effect. ELECTRICITY AND MAGNETISM 18. Electrostatics, electric charge, Coulomb's law, electric field, Gauss's law, electric capacitance. 19. Electric current. Ohm's law and Kirchhoff's law. Direct-current circuits. 20. Magnetic field and its sources. Electromagnetic induction. Inductance. Alternating current circuits. 21. Electromagnetic waves.
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PHYSICS – semester 2	
Semester	Summer semester
Number of ECTS	5
Number of classes	CLASSES 15+ LABORATORIES 15h
Description	Solving and discussion of tasks, analysis of results from the topics covered in the auditorium, including: 1. Basics of vector calculus: addition and subtraction of vectors, multiplication of a vector by a scalar, scalar and vector product. 2. Kinematics and dynamics of a material point. 3. Newton's principles of dynamics. Law of universal gravitation. 4. Conservation of energy. 5. Elastic and inelastic collisions. 6. Static equilibrium and elasticity. 7. Statics. Coordinates of the centre of mass. Rigid body dynamics. 8. Hydrostatics and hydrodynamics. 9. Mechanical and thermodynamic properties of solids, liquids and gases. 10. Simple and damped harmonic vibration. 11. Mechanical and electromagnetic waves. Parameters describing waves. 12. Electric current. Ohm's law and Kirchhoff's law. Direct current circuits. Introduction to lab classes, introducing students to the principles of safe measurement, preparation of reports, including processing and analysis of measurement results. Estimation of measurement uncertainty. 1. Determination of speed of sound in air by a time-of-flight method. 2. Determination of gyroscope moment of inertia. 3. Physical pendulum problems – finding moment of inertia. 4. Determination of modulus of rigidity by a torsion pendulum. 5. Estimation of coefficient of linear expansion of solids by electrical method. 6. Determination of the (EMF) electromotive force of a cell. 7. Examination of current flow laws. 8. Investigation of the temperature dependence of metal and semiconductor resistance.

CHEMISTRY	
Semester	Winter semester
Number of ECTS	2
Number of classes	LECTURE 15 h + LABORATORIES 15 h

Description	1. Classification and characteristics, and safe procedures in handling dangerous chemical substances, warning pictograms and symbols, symbols of dangers and safe handling, characteristics cards. 2. General characteristics of selected groups of organic and inorganic compounds, systematic names, molecular/structural/graphic formulas, ionic and molecular compounds. 3. Atomic structure: elementary particles of matter, quantum numbers, electronic structure and electron shell structure of selected elements, general characteristics of elements of s, p, d, f blocks. 4. Structure of a molecule: electronegativity scale, chemical bonds, hybridization of atomic orbitals and spatial structures of selected molecules of chemical compounds, polarity of molecules. 5. Periodic system of elements used for the prediction of reactivity and properties of chemical substances: periodicity of physical properties of elements – atomic radius, ionic radius, ionization energy, trends of electro positivity, electronegativity and electron affinity, general characteristics of selected element groups versus the periodic system. 6. Real solutions and colloid systems, molar heat of solution, electrolytic solutions, dissociation of acids, bases and salts, degree of dissociation, dissociation constant, theories of acids and bases, ionic product of water, pH scale and indicators, pH buffers, solubility product, reaction of salt ions with water. 7. Classification of chemical reactions, reactions of: neutralization and hydrolysis, precipitation, oxidation and reduction; equilibrium constant, principle of mobile equilibrium (Le Chatelier-Braun's principle) and the influence of external factors on the chemical equilibrium. 8. Catalysis and catalysts: classification, activation energy, homogeneous and heterogeneous catalysis, mechanism of catalytic action, chain and photochemical reactions. 9. Concepts of electrochemistry: metal electrode potential, standard (normal) potential, electrochemical series of metals and its role in shipbuilding, electrochemical cells, electrochemical corrosion and hull protection against corrosion.
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COMPUTER SCIENCE – semester 1	
Semester	Winter semester
Number of ECTS	2
Number of classes	LABORATORIES 30h
Description	1. Construction of a PC. 2. Operating systems – structure and configuration. 3. Operation of selected utility programs. 4. Operation of selected application programs. 5. Word processor MS Word. 6. Computer networks – LAN. 7. Computer networks – Internet, WWW, FTP, e-mail, browsing for information. 8. Spreadsheet MS Excel. 9. Databases – MS Access. 10. E-mail.

COMPUTER SCIENCE – semester 2	
Semester	summer semester
Number of ECTS	2
Number of classes	LABORATORIES 30h
Description	1. Graphic presentation – MS PowerPoint. 2. Algorithms. 3. Conditional instruction IF with complex conditions, use of logical operators, embedded instructions. 4. loop FOR. 5. DO/LOOP. 6. Index variables. 7. Loops – exercises, procedures and functions, declaration, use. 8. Loops – exercises, complex variables (vector), cooperation with a spreadsheet. 9. Embedded loops, complex variables (tables). 10. Operations on data files. 11. Project – a problem-based task.

AUTOMATION semester 5	
Semester	Winter semester
Number of ECTS	2
Number of classes	LECTURE 15h + LABORATORIES 15h
Description	1, Basic concepts of automation. Structure, principle of operation, and block diagram of a ship's heading automatic control system. 2. Signal conversion in automation. Operator and spectral transfer functions, time-varying characteristics of elements and systems.

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	3. Characteristics and properties of basic linear elements. 4. Analogue continuous controllers - characteristics, properties, settings. 5. Requirements for control systems (stability and control quality). 6. Basic concepts of digital technology in automation. 7. Marine computer automatic control systems
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ELECTRONICS AND ELECTROTECHNOLOGY semester 2	
Semester	summer semester
Number of ECTS	2
Number of classes	LECTURE 15h+ LABORATORIES 15 h
Description	1. Electrical signals. 2. RLC elements. 3. Semi-conductor elements. 4. Spectral analysis of signals. 5. Propagation of radio waves. 6. Amplitude modulation. 7. Frequency and phase modulation. 8. Demodulation. 9. Amplifiers. 10. Negative feedback. 11. Generators. 12. Power supply units. SEMESTER 2

ELECTRONICS AND ELECTROTECHNOLOGY semester 3	
Semester	Winter semester
Number of ECTS	2
Number of classes	LECTURE 15 + LABORATORIES 15H
Description	1.General: voltage, intensity, electromotive force of a source of voltage; direct current (DC) circuits – Ohm’s and Kirchoff’s laws; energy and power in DC circuits. 2. Marine batteries: types, principle of operation and use/maintenance. 3. AC circuits – basic concepts, RLC circuits, reactance, impedance, active/reactive power, complex and apparent power, AC effective (rms) and mean values, electromagnetic induction and self-induction. 4. Three-phase circuits: inland and shipboard power grids, their parameters types of connection, power of three-phase receivers. 5. Electrical measurements: notations, principle of operation of basic measuring instruments; measurement of electrical parameters of RLC elements in electric circuits. 6. DC machines: construction and principle of operation, types and basic characteristics of DC machines. 7. AC machines: asynchronous machine, construction and principle of operation, its motoring operation; synchronous machine, construction and principle of operation, generator operation.

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	8. Transformers: construction and principle of operation, working modes of transformers. 9. Marine electrotechnology. 9.1. Generation and distribution of electric power on a ship. 9.2. Emergency power supply, starting up an emergency generating set. 10. Protection against electrocuting: risks and protective measures in: a) grounded networks; b) insulated networks.
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MACHINE CONSTRUCTION AND ENGINEERING GRAPHICS	
Semester	Winter semester
Number of ECTS	3
Number of classes	LECTURE 15h+ CLASSES 15h + LABORATORIES 15h
Description	1. Principles of rectangular projection. 2. Cross-sections and intersection of solids, axonometry. 3. Simplified representation. 4. Sequence of dimensions recording. 5. Temporary and permanent joints. 6. Characteristics of working and assembly drawings. 7. Use of CAD programs for creating and edition of construction drawings. 8. The concept of a machine, classification of machines by use. 9. Principles of operation and types of energy. 10. Principles of construction. 11. Axles and shafts, bearings, couplings and brakes, gears. 12. Strength of materials. 13. Fatigue strength of machine compone Laboratories 1.Exercises in making projections, auxiliary views, details, cross-sections, re- volved sections, broken out sections of machine components. 2. Dimensioning of machine components. 3. Presentation of a contruction sketch. 4. Use of a CAD program for recording a design. 4.1. Program interface. 4.2. Disk operations. 4.3. Creation and editing of objects. 4.4. Dimensioning of objects. 4.5. Preparation of a drawing for printing. 5. Analysis of technical documentation of machines

TRANSPORT SYSTEMS	
Semester	Winter semester
Number of ECTS	1
Number of classes	LECTURE 15h
Description	1.Types and assessment of transport systems. 2. Organization and technology of cargo and passenger carriage.

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	3. Procedures and documents. 4. Infrastructure management. 5. Management of the means of transport. 6. Identification of standards and safety assessment in transport systems. 7. Operational and dispatching services in transport systems. 8. Reporting and traffic management systems in navigation.
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FUNDAMENTALS TO ECONOMICS	
Semester	Summer semester
Number of ECTS	1
Number of classes	LECTURE 15h
Description	1. Essence, goals and regularities of management, economy as a system, characteristics of basic economic systems, management in conditions of ecological hazards. 2. Creation, recording and distribution of national income, state budget and fiscal policy, economic growth. 3. Role of the state in market economy, options and dilemmas of Polish economic system transformation. 4. Market economy; market segments, basic categories and market participants, theory of consumers' choice, market mechanism. 5. Functioning of a company in the market economy, forms of companies, company operation efficiency, strategies of company development. 6. Functioning of the money-capital market; money – evolution of money and its functions, basic operations on the money market, functions, tasks and goals of banks, securities market, functioning of a stock exchange. 7. Labor market; labor supply and demand; unemployment as a symptom of unbalanced labor market, causes and effect of unemployment, unemployment versus inflation. 8. Global economy, globalization of the world economy, international economic cooperation and economic integration. Main social and economic problems of the contemporary world.

ERGONOMICS	
Semester	Summer semester
Number of ECTS	1
Number of classes	LECTURE 15h
Description	BASIC PROBLEMS OF ERGONOMICS 1. Definitions of ergonomics. 2. Interdisciplinary character of ergonomics. 3. Use of ergonomics in the human environment. 3.1. Social and economic aspects of ergonomics. 3.2. Ergonomics and job satisfaction. 3.3. Ergonomics for older people.

	3.4. Ergonomics of mass products. 4. Trends in ergonomics. 4.1. Corrective ergonomics. 4.2. Conceptual ergonomics. 4.3. Approval of machine and device prototypes. 5. Person – work system. 6. Physical conditions of work, influence of work environment on a person. 7. Physical and chemical factors of work environment. 7.1 Micro climate. 7.2 Lighting. 7.3 Colours. 7.4 Noise. 7.5 Vibrations. 7.6 Dusts. 7.7 Radiation. 8. Workload. Static and dynamic work. 9. Physiology of human body and physical work. 9.1. Influence of the posture on physical and mental state. 9.2. Spine bio-mechanics principles. Mechanisms of forming muscular-skeletal disorders. Avoidance of overloads. 9.3. Regeneration of mental and physical power at work. 10. Ergonomic factors in shaping the work environment. 10.1. Work space. Anthropometry, person models. 10.2. Design and distribution of workstations. 11. Computer station. 11.1 Effects of using a computer on human body. 11.2 Parameters of working conditions. Computer monitor as a source of radiation. 11.3 Height of a chair, desk and vision angle of computer screen. 11.4 Counter-indications for work at computer stations. 12. Nervous system and mental work. 13. Rest during and after work. 14. Ergonomic research. 14.1. Ergonomic assessment of machine and device designs and prototypes. 14.2. Methods and techniques used in ergonomic research. 14.3. Examination of mental and physical load. 14.4. Examination of physical environment of work. 15. Work security. 15.1. Occupational diseases. 15.2. Accidents at work. 15.3. Work safety management.
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ELECTRICAL AND ELECTRONIC ENGINEERING semester 2	
Semester	Summer semester
Number of ECTS	2
Number of classes	LECTURE 15h + LABORATORIES 15h
Description	1.General: voltage, intensity, electromotive force of a source of voltage; direct current (DC) circuits - Ohm's and Kirchoff's laws; energy and power in DC circuits. 2. Marine batteries: types, principle of operation and use/maintenance. 3. AC circuits - basic concepts, RLC circuits, reactance, impedance, active / reactive power, complex and apparent power, AC effective (rms) and mean values, electromagnetic induction and self-induction. 4. Three-phase circuits: inland and shipboard power grids, their parameters types of connection, power of three-phase receivers. 5. Electrical measurements: notations, principle of operation of basic measuring instruments; measurement of electrical parameters of RLC elements in electric circuits. 6. DC machines: construction and principle of operation, types and basic characteristics of DC machines. 7. AC machines: asynchronous machine, construction and principle of operation, its motoring operation; synchronous machine, construction and principle of operation, generator operation. 8. Transformers: construction and principle of operation, working modes of transformers. 9. Marine electrotechnology. 9.1. Generation and distribution of electric power on a ship. 9.2. Emergency power supply, starting up an emergency generating set. 10. Protection against electrocuting: risks and protective measures in: a) grounded networks; b) insulated networks.

MACHINE CONSTRUCTION AND ENGINEERING GRAPHICS	
Semester	Winter semester
Number of ECTS	3
Number of classes	LECTURE 15h + CLASSES 15h + LABORATORIES 15h
Description	1.Principles of rectangular projection. 2. Cross-sections and intersection of solids, axonometry. 3. Simplified representation. 4. Sequence of dimensions recording. 5. Temporary and permanent joints. 6. Characteristics of working and assembly drawings. 7. Use of CAD programs for creating and edition of construction drawings. 8. The concept of a machine, classification of machines by use.

PORT INFRASTRUCTURE	
Semester	

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Number of ECTS	1
Number of classes	LECTURE 15h
Description	1. Ports and port basins. 1.1. Types of ports. The main dimensions of different terminals in the port. 1.2. Depths of port basins, underkeel clearance (UKC), static and dynamic UKC. 1.3. Waterway elements and their parameters (roads, anchorages, approach and port channels, port entrance, turning basins, lay-bys, port basins). 2. The main characteristics of the ships. 2.1. Different types of sea going vessels. Parameters. 2.2. Ship manoeuvring and hydrodynamic behaviour in port waters (approach channels, manoeuvring areas within the port, port basin, berth areas): shallow water effect, bank effect, ship-generated wave, back currents/streams and wakes (propeller streams). 3. Design and construction of port structures. 3.1. Types of structures (breakwaters, wharves, piers, jetties) 3.2. Maximum depth at the wharf. 3.3. Shore and bottom strengthening, dredging and sand filling. 4. Stability of a port structure. 4.1. Active and passive earth pressure. 4.2. Interactions of a ship, waves, current, load from cargo handling equipment and storage. 5. Determination of manoeuvring areas. 5.1. Assessment criteria for ship manoeuvring safety. 5.2. Navigational risk. 5.3. Methods of manoeuvring area determination. 6. Impact of ship on the berth. 6.1. Ship's thrust and drag. 6.2. Impact energy of berthing and mooring. 6.3. Interaction of the propeller. 7. Details of berthing facilities for different type of berth. 7.1. Mooring equipment. 7.2. Fender systems. 7.3. Rescue equipment. 8. Offshore structures. 8.1. Drilling and production rigs. 8.2. Underwater structures and facilities (tunnels, pipelines, cables). 8.3. Probability of ship's collision with a port/offshore structure. 8.4. Structure protection against ship's impact.

Vocabulary

(A)	Lectures:	The lecturer teaches students interrelated contents of a subject based on his / her knowledge, using various teaching methods.
(C)	Classes:	knowledge and skills are acquired by solving computing problems. The teacher directs students and supervises the classes.
(L)	Laboratories:	knowledge and skills are acquired by performing practical or experimental work. The teacher directs students and supervises the lab classes. Students do practical work or make experiments.
(P)	Project:	The work relates to engineering developments and seeking solutions to technical problems.