

MARINE ELECTRICAL ENGINEERING FACULTY

PROGRAMME of STUDIES		
B.Sc. Programme	Faculty of Marine Electrical Engineering	
	Section:	Electrotechnics

Summer semester
(February-June)

Course title/description	ECTS	sem
English language <i>Description:</i> .. Communication in everyday life situations. Basis of English phonetics. Basic engineering classification. Electric vocabulary. IT: computer, word processor, folder creation, internet – vocabulary. Co-ordination of computer systems. Developing abilities of using constructions in passive voice in writing on the basis of computer grammatical exercises and authentic handling instructions and in speech on the basis of conversational exercises. Electrotechnology – electric engine, construction and description of functions. Kinds of alarm systems and their functioning	3	2
Materials engineering II <i>Description:</i> Measurement of magnetic losses and their components in magnetic materials. Measurements of dielectric constant and tg. Measurements of dielectric strength. Measurements of volume and surface resistivity of dielectric materials.	1	2
Numerical Methods <i>Description:</i> Number Systems. Interpolation and approximation, orthogonal series, an introduction to wavelet. Basic numerical methods for: solving linear and nonlinear algebraic equations, solving differential equations, searching the extreme, and other selected methods.	2	2
Fundamentals of electrotechnics I <i>Description:</i> Electrical principles, D.C circuit theory. Linear circuit elements, series circuits, parallel networks, potential divider, current divider. Calculation of D.C circuit quantities with the help of circuit laws and theorems. Nonlinear circuit elements. Alternating voltage and currents, waveforms, the equation of a sinusoidal waveform, combination of waveforms, single phase a.c circuits. Revision of complex numbers, application of complex numbers to A.C networks.	7	2
Fundamentals of electrotechnics III <i>Description:</i> Introduction to the Mathcad. Multi-loop DC Circuit (star-delta conversion). The principle of superposition and reciprocity. Thevenin 's theorem , the characteristic of a nonlinear element. The parameters of equivalent coil circuit with and without iron core. Reactive power compensation. Voltage and current resonance and ferroresonance. Three-phase systems. The mean and RMS values. Harmonic analysis of analytic and non-analytic periodical functions	2	4
Metrology I <i>Description:</i> Definitions of basic metrological notions, the analysis of the error and uncertainty measurement, measurement methods, electromechanical converters, analog-to-digital and digital-to-analog conversion, analog and digital measurements of electrical and non-electrical quantities, transmission and recording of measurement signals, computer-aided measurement systems. Calibration and expanding ranges of instruments. Measurements of large resistance and insulation resistance and bridge impedance measurements. Testing of the electromechanical instruments. Rectifier voltmeters. Analog and digital time and frequency measurements. Electronic oscilloscope. Power measurements in single-phase and three phase system. Wheatstone, Thomson and impedance bridges.	4	2

Computer-aided engineering calculations I Components of the MATLAB-Simulink programming environment. Using available tools: editor, Live Editor, debugger, parser, profiler. Alternative methods of accessing MATLAB. Solving ordinary differential equations in MATLAB and Simulink. Modeling dynamic systems. Executing a cycle of programming tasks in the MATLAB, Simulink, and MATLAB-Grader environments.	2	2
Electrical Machines II <i>Description:</i> Laboratory exercises. DC generator and motor. Single and-phases transformer. Squirrel-cage, slip-ring and multiple-speed motor. Synchronous machine properties, cooperation generator-power system testing, V curve measuring. Selsyns, single-phase and step motors.	2	4
Electronics and Power Electronics I <i>Description:</i> Semiconductor and optoelectronic components. Diagnostics. Amplifiers. Stabilizers. Generators. Converters.	2	2
Electronics and Power Electronics III <i>Description:</i> Laboratory exercises – thyristors; working conditions of power components; triacs; power transistors; power converters; rectifiers; safety arrangements of thyristor and transistor systems, active and passive power.	2	4
Electric power engineering <i>Description:</i> Classification of power plants. Basic parameters characterizing the operation of these facilities. Non-renewable energy sources: conventional thermal power plants, nuclear power plants. Renewable energy sources of various types: OWF, WF, biofuels, hydroelectric power plants, solar panels, photovoltaics. Operation of power distribution networks. Testing the operational properties of a power system model. Testing emergency conditions in a power system.	3	4
Fundamentals of Control Engineering I <i>Description:</i> Rules of control engineering. Mathematical description of linear dynamic systems. Description methods of elements and control systems. Basic elements of control systems and their properties. Characteristics of typical static and astatic control objects. Identification of properties of the static and dynamic control objects. Structural diagrams. Requirements to control systems. Continuous PID controllers. Synthesis of control system with state object control feedback	1	2
Microprocessor Control Systems I <i>Description:</i> Microprocessor's arithmetic. Microprocessor information coding. Architecture of microprocessor system. Microcontroller core architecture, memory map, instruction set. Assembler language. Addressing modes. On-chip peripherals: I/O port, timer/conter, serial communication interfaces, AD and DA converters, watchdog. EEPROM and FLASH memory of the microcontroller. ISP/IAP programming modes. Microcontroller programming languages.	2	2
Microprocessor Control Systems III Design, implementation, and programming of a microprocessor system.	1	4
Electrical Apparatus <i>Description:</i> Environment. Electrical equipment technical characteristics. Safe use consideration. Electrical connectors. Contacts. The electric arc. Electrical protections. Electrical Switchgears. Installation equipment. Cables.	3	4

Ship Electrical Drives Control Systems I <i>Description:</i> Equations of motion. Energy storing. Machinery characteristics – parameters, schemes, equations, power distribution, starting, braking, control. Transient state of electric machine.	2	4
Fundamentals of Control Engineering III <i>Description:</i> Electric, mechanical, pneumatic and hydraulic elements and devices control systems. Pneumatic continuous PID controllers. Pneumatic and hydraulic executive devices. The dynamic properties investigations of the control object. The identification of the control object. Manual tuning of the continuous PID controller. The control system synthesis with the method state variable with poles positioning of closed-loop system.	4	4
Digital Circuits Theory and Technology II <i>Description:</i> Synthesis of combinational circuits, characteristics of digital circuits. Arithmetical blocks. Bistable flip-flops. Synthesis of sequential circuits. Counters and registers of integrate scale. Circuits of time dependences. Circuits of steering a stepper motor, an anchor lift. Steering the crane model with programmable circuits CPLD or FPGA. Computer simulation of advanced digital circuits.	2	2
Power System Control & Automation I <i>Description:</i> Development of ship board automation, degree of automation in engine room, essential safety for unattended machinery spaces, centralized control station, control console, layout, controls, alarms, visual displays, data loggers. Bridge control of main machinery, instrumentation for UMS classification. Main Engine and Ancillary Subsystems, Ship Electrical Power Plant.	2	4
Programmable Logic Controllers I <i>Description:</i> PLC construction, Hardware, PC-PLC Communication, Editors. Memory organization: memory areas, Data types, addressing. Bit and Byte Access., Programming: logic functions, edge detection, bit memory, flip-flops, timers, counters, wave generators, Program structure: Functions, Function Blocks, Data blocks. Interrupts, Examples: pump control, direction detection, industrial sequence control systems	4	4
Marine Electric Equipment Maintenance <i>Description:</i> Types of electrical drawing. Graphic symbols used in electrical schemes standardized according to IEC regulations, Reading and interpreting electrical and electronic schemes of vessel facilities on the basis of technical documentation, Competences and powers of maritime administration, Authority classifying vessels. Its powers and classification principles of electric facilities, Technical documentation and arrangement of maintenance crew on a ship Computerized management information system of overhaul, maintenance and spare parts of electric facilities and automatics	1	

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