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

Summer semester
(February-June)

Course title/description	ECTS points
English language *Description*:. 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	2
Materials technology *Description:* 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
Numerical Methods *Description:* 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
Fundamentals of electrotechnics Description: Three phases circuits. Non sinusoidal voltage and current waveforms, harmonic analyses, Dirichlet's conditions, Fourier series, Pearseval's theorem, The transient in D.C and A.C circuits, Laplace transform, inverse Laplace transforms, a solution of differential equations (operational method). Transmission lines, basic phenomena and quantities, phase delay, wavelength, velocity of propagation, current and voltage relationships	5
Metrology I *Description:* 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.	3
Electronics and Power Electronics I *Description:* Semiconductor and optoelectronic components. Diagnostics. Amplifiers. Stabilizers. Generators. Converters.	3
Fundamentals of Control Engineering I *Description:* 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	3
Digital Circuits Theory and Technology *Description:* Numeration systems and codes. Theory of digital circuits. Basic digital circuits. Digital signals and gates, logical symbols. Analysis and synthesis of combinational circuits and sequential circuits. Realization of combinational and sequential circuits. Functional blocks of the average scale of integration. Synthesis of atypical synchronous and asynchronous circuits.	5

Metrology II *Description:* Temperature sensors, differential photodetector, analog and programmable transducers, converters, 4-20mA standard, HART transmitters, measurement channels and their application for selected non-electrical quantities measurements, diagnostics of the measurement channels.	2
Electrical Machines *Description:* 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
Electronics and Power Electronics II *Description:* 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
Microprocessor Control Systems *Description:* Microcontrollers programming in C language. Typical components of the microprocessor system. Data buses: RS 232, RS 422, RS 485, I2C, CAN, USB. 16 and 32-bit microcontrollers. Evaluation microprocessor system. Compiling and linking of programs in C. Microcontroller ports. Self-realization of complex program using the previously known components.	4
Electrical Apparatus *Description:* Environment. Electrical equipment technical characteristics. Safe use consideration. Electrical connectors. Contacts. The electric arc. Electrical protections. Electrical Switchgears. Installation equipment. Cables.	2
Ship Electrical Drives Control Systems *Description*: Equations of motion. Energy storing. Machinery characteristics – parameters, schemes, equations, power distribution, starting, braking, control. Transient state of electric machine**.**	2
Fundamentals of Control Engineering II *Description*: 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.	2
Power System Control & Automation *Description:* 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

Programmable Logic Controllers *Description:* Combinational logic, sequential logic. Digital control systems. Sequential control, Moore and Mealy machine, process controlled and time controlled systems. Description of control systems: states, system variable, transitions, output functions. Control system synthesis. Programming of drive control, system testing by DC motors and 3-phase drives.	1
HMI Engineering *Description:* HMI destination and application. HMI communication basics: HMI-PC, HMI-PLC. Editing and presentation of PLC variables on HMI. Lamps, Numeric and Message Displays. Switches, keypads. Screens, graphics, functional switches. Alarm windows, animation, scripts. Examples: interfaces for wave generator, drive control. Synthesis of an control system with PLC, touch panel.	2
Marine Electric Equipment Maintenance *Description*: 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