Faculty of Maritime Studies / Pomorska elektrotehnika (2017) / Brodski električni uređaji

Prerequisites	The precondition for attendance is passed exam of "Fundamentals of Electrics and Electronics"
Aims	The aim of this course is to familiarize the students with electrical system on board (electrical sources, transformers and electricity consumers), their role, application, diversity, and mathematical models. In the category of consumers, special emphasis is given to electrical machines the types and structures of which are predominantly encountered onboard ships. In addition, students are presented the application of power electronic devices that enable the conversion and adjustment of voltage and current to the devices' operating modes.
Lecturer / Teaching assistant	Vladan RADULOVIĆ, PhD – professor
Metdod	Lectures, exercises, guiding examples, laboratory exercises. Consultation.
Week 1, lectures	Electrical appliances and equipment on board. Definitions, basic division.
Week 1, exercises	
Week 2, lectures	Sources of electrical energy on the ships. DC and AC generators.
Week 2, exercises	
Week 3, lectures	The principle of operation of synchronous generators, design, excitation systems.
Week 3, exercises	
Week 4, lectures	Transformers: working principle, the basic equations, equivalent circuit of single-phase transformers.
Week 4, exercises	
Week 5, lectures	The power balance, parallel operation, the cooling of transformer. Three-phase transformers.
Week 5, exercises	
Week 6, lectures	Compulsory test I
Week 6, exercises	-
Week 7, lectures	Electricity consumers on board. Classification. Mathematical models of lighting, air conditioning, thermal consumers.
Week 7, exercises	
Week 8, lectures	Asynchronous machines: the principle of operation, torque characteristics and power losses, the utilization factor.
Week 8, exercises	
Week 9, lectures	Starters for squirrel cage induction motor, induction motor starters with wound rotor. Testing, maintenance, regulations, marine design of induction motors.
Week 9, exercises	
Week 10, lectures	The principle of operation of synchronous motors, staring, torque characteristics, V-curves.
Week 10, exercises	
Week 11, lectures	The principle of the DC motor and generator, basic equations, structure.
Week 11, exercises	
Week 12, lectures	Armature reaction, types of motives, starters.
Week 12, exercises	
Week 13, lectures	Compulsory test II
Week 13, exercises	-
Week 14, lectures	Universal motor, maintenance, testing, regulations, ship design.
Week 14, exercises	
Week 15, lectures	Elements of marine power electronics. Rectifiers and inverters.
Week 15, exercises	
Student obligations	Students are required to attend lectures, lab work and both tests.
Consultations	
Workload	Per week 6 credits x 40/30 = 8 hours Structure: 3 hours of lectures 1 hour of exercises 1 hour of laboratory practice 4 hours of individual work, including consultation During semester Lectures and final exam (8 hours) x 16 = 128 hours. Necessary preparations before the start of semester

	(administration, enrollment, etc) 2 x (8 hours) = 16 hours. Total hours for the course 6 x 30 = 180 hours Additional hours for preparation for the correction term(s), including the exam taking from 0 to 36 hours. Structure: 128 hours (lectures) + 16 hours (preparation) + 36 hours (additional work)
Literature	
Examination metdods	4 tests with 2.5 points (10 points) Compulsory tests I - 20 points Compulsory test II - 20 points Final exam - 50 points
Special remarks	
Comment	
Learning outcomes	• Explain the basic concepts in the field of marine power systems with high and low voltage (production and consumption of electric energy) • Understand the basic principles of electrical conversion • Describe AC and DC voltage sources on ships • Describe distribution of electrical energy on ships • Understand and analyze basic principle of transformer application • Distinguish different types of electric motor • Understand work principles of DC and AC induction and synchronous motor