**Course description**

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| **Generic information** |
| Head of Course | Assoc. Prof. Irena Jurdana, PhD |
| Course | Electrical Measurement and Instrumentation |
| Study Programme | Marine Electronic Engineering and Information Technology |
| Type of Course | Mandatory |
| Year of Study | 1. |  |
| Estimated Student Workload and Methods of Instruction | ECTS coefficient of Student Workload | 5 |
| Number of Hours (L+E+S) | 30+30+0 |

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| **1. GENERAL COURSE DESCRIPTION** |
| *1.1. Course Objectives*  |
| Acquisition of knowledge on electrical engineering, measurement methods and measuring instrumentation.Ability to independently measure basic electrotechnical values according to the STCW Convention |
| *1.2. Prerequisites for Course Registration*  |
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| *1.3. Expected Learning Outcomes*  |
| 1. Describe the measurements of physical values and the measurement result2. Compare electrical measuring instruments with digital instruments3. Analyse resistance, capacity and inductance measurements4. Interpret voltage and current range extensions5. Apply digital measuring instruments6. Describe the principle of operation of the oscilloscope and basic measurements7. Understand non-electric measurements8. Analyse remote measurements and measurement systems |
| *1.4. Course Outline*  |
| Measurement of basic physical values. Expression of the measurement results. Electronic measurement instruments. The use of measurement instruments. Measurement systems in ship and maritime industry applications. Measurement of electrical current, voltage and impedance. Measurement of electrical power and energy. Electrical current and voltage sources. Measuring parameters of the electric signal in the time domain and frequency domain. Measurements on optical fibers. Remote measurements. Measurement of non-electrical quantities |
| *1.5. Modes of* *Instruction*  | [x] Lectures[ ]  Seminars and workshops [ ]  Exercises [ ]  E-learning[ ]  Field work | [x]  Practical work [ ]  Multimedia and Network [x]  Laboratory[ ]  Mentorship[ ]  Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| *1.6. Comments*  | - |
| *1.7. Student Obligations*  |
| Regular attendance to lectures, to 1st and 2nd mid-term exam, presentation of exercises in the practical work session, final exam. |
| *1.8. Assessment1 of Learning Outcomes*  |
| Course attendance | 2 | Class participation | 0,5 | Seminar paper |     | Experiment |     |
| Written exam | 1 | Oral exam | 1 | Essay |     | Research |     |
| Project |     | Continuous Assessment | 0,5 | Presentation |     | Practical work |  |
| Portfolio |     |  |     |  |     |  |     |

1 **NOTE:** Name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course. Use empty fields for additional activities.

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| *1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam*  |
| *The process of evaluating acquired learning outcomes is based on the regulation on University of Rijeka Studies and the regulation on Studying at the Faculty of Maritime Studies in Rijeka as follows:*• Through continuous assessment of knowledge during the course, 70% of the learning outcomes gained through the 1st mid-term exam - learning outcomes 1-4 (25%), 2nd mid-term exam - learning outcomes 5-8 (25%) are valued, including presentation of the practical task - learning outcomes 1-8 (10% in each mid-term exam); the student must achieve at least 50% points for each mid-term exam.• 30% of the learning outcomes (1-8) are evaluated in the final part of the exam (oral), with the student passing the final exam at least 50% of the points.Examples of learning outcomes in relation to the set learning outcomes are:1. Define the basic measured size, understand the international measurement system, distinguish physical size measurements, and show examples of measurement results.2. Define and explain the parameters of comparison of electrical measuring instruments with digital instruments.3. Identify and interpret different measurement methods of resistance, capacity and inductance.4. Explain the extension of the voltage and current metering range.5. Apply digital measuring instruments for basic measurements and display measurement results in graphic and numeric form.6. Understand the use and functions of the oscilloscope basic measurements.7. Explain the application of measurements on fiber optics and comment on the advantages and disadvantages of such application.8. Describe and explain the frequency measurements and measure the basic signal characteristics. 9. Summarise describing measurement methods, and application in maritime industry measurement of non-electric values.10. Explain the use of remote sensing systems. |
| *1.10. Main Reading*  |  |  |
| 1. V. Bego, Mjerenja u elektrotehnici, Graphis, Zagreb, 2003.2. D. Vujević, B. Ferković, Osnove elektrotehničkih mjerenja, I. i II. dio, Školska knjiga, Zagreb, 2001.3. F. Mlakar, Električna mjerenja, Tehnička knjiga, Zagreb, 2003.4. G.P. Agrawal: Fiber-Optic Communication Systems, John Wiley, 2010.5. J.P.Dakin, Handbook of Optoelectronics, Taylor&Francis Group, 2006.6. Reading material available on e – learning system - Merlin - (https://moodle.srce.hr) |
| *1.11. Recommended Reading*  |  |  |
| 1. A. Šantić, Elektronička instrumentacija, 3. izdanje, Školska knjiga, Zagreb, 1993.2. C. F. Combs, (ed.), Electronic Instrument Handbook, 3rd ed, McGraw-Hill, New York, 19993. Reading material available on e – learning system - Merlin (https://moodle.srce.hr) |
| *1.12. Number of Main Reading Examples*  |  |  |
| *Title*  | *Number of examples*  | *Number of students*  |
| V. Bego, Mjerenja u elektrotehnici, Graphis, Zagreb, 2003. | 6 | 70 |
| D. Vujević, B. Ferković, Osnove elektrotehničkih mjerenja, I. i II. dio, Školska knjiga, Zagreb, 2001. | 4 | 70 |
| Reading material available on e – learning system - Merlin (https://moodle.srce.hr) | - | 70 |
| *1.13. Quality Assurance*  |
| The quality of the study is constantly monitored in accordance with the ISO 9001 system implemented at the Faculty of Maritime Studies in Rijeka. An analysis of exams is made annually, and once in semester is conducted by anonymous student evaluation of teaching. |