**Course description**

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| **Generic information** | | | |
| Head of Course | Assoc. Prof. Irena Jurdana, PhD | | |
| Course | Optoelectronic systems | | |
| Study Programme | Marine Electronic Engineering and Information Technology | | |
| Type of Course | Mandatory | | |
| Year of Study | 2. |  | |
| 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* | | | | | | | | |
| Acquire knowledge on the basic features of fiber optic communication networks and systems. Ability to independently perform measurement of the fundamental transmission parameters of fiber optic transmission systems, use of basic measurement instruments, and basic maintenance of fiber optic systems. Ability to independently plan and design fiber optic networks. | | | | | | | | |
| *1.2. Prerequisites for Course Registration* | | | | | | | | |
| - | | | | | | | | |
| *1.3. Expected Learning Outcomes* | | | | | | | | |
| 1. Describe and understand the physical phenomena of light propagation  2. Analyse the types of optic fibers and cables  3. Understand the attenuation and dispersion effects  4. Indicate passive and active optical components  5. Analyse the types and application of fiber optic transmission systems  6. Describe methods and instrumentation for measurements on fiber optic systems  7. Compare and distinguish the reliability and availability of the fiber optic network  8. Describe the types and use of optical sensors | | | | | | | | |
| *1.4. Course Outline* | | | | | | | | |
| History of optical communication. Introduction in physical definition and principal laws of optics. Optical transmission systems – elements, production, parameters. Fibers and cables types, production and application. Application of fiber optics in telecommunications. Planning and constructing optical cable transmission systems. Measurement of optical parameters, definition and test methods for the relevant parameters of optical systems, measurement equipment. Availability and reliability of optical network. Mathematical availability models of network. Trends in optical network domain: WDM, DWDM, PON, FTTx. Optical sensors. Submarine optical network systems. | | | | | | | | |
| *1.5. Modes of*  *Instruction* | | Lectures  Seminars and workshops  Exercises  E-learning  Field work | | | Practical work  Multimedia and Network  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 |  | Seminar paper | |  | Experiment |  |
| Written exam | 0,5 | Oral exam | 0,5 | Essay | |  | Research |  |
| Project |  | Continuous Assessment | 2 | 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 and understand the physical phenomena of light propagation  2. Analyse the types of optic fibers and cables  3. Identify and interpret different attenuation and dispersion impacts  4. Indicate passive and active optical components  5. Analyse the types and application of fiber optic transmission systems  6. Describe and explain methods and instrumentation for measurements on fiber optic systems and show measurement results in graphic and numeric form  7. Understand the methods of mathematical modeling of fiber optic networks  8. Explain the use of optical sensors. | | | | |
| *1.10. Main Reading* |  | |  | |
| 1. G.P. Agrawal: Fiber-Optic Communication Systems, John Wiley, 2010. 2. J.M. Lopez-Higuera (editor): Optical Fibre Sensing Technology, John Wiley & Sons, 2002. 3. R. Ramaswami, K.N. Sivarajan, G.H. Saski: Optical Networks: A Practical Perspective, 3rd ed., Elsevier, 2010. 4. J. Chesnoy: Undersea Fiber Communication Systems, Academic Press, 2002. 5. J.P.Dakin, Handbook of Optoelectronics, Taylor&Francis Group, 2006. 6. Bažant, A. i dr.: Telekomunikacije - tehnologija i tržište, Element, Zagreb, 2007. 7. Bažant, A. i dr.: Osnovne arhitekture mreža, Element, Zagreb, 2014. 8. Reading material available on e – learning system - Merlin - (https://moodle.srce.hr) | | | | |
| *1.11. Recommended Reading* |  | |  | |
| 1. W.D. Grover, Mesh-based Survivable Networks:Options and strategies for Optical, MPLS, SONET and ATM networking, Prentice Hall PTR, 2004. 2. J.P. Vasseur, M. Pickavet, P. Demeester, Network recovery: Protection and Restoration of Optical, SONET-SDH, IP, and MPLS, Elsevier, 2004. 3. K. van Dokkum, Ship Knowledge: A Modern Encyclopedia, Dokmar, Netherland, 2003. 4. A. Selvarajan, S. Kar, T. Srinivas: Optical Fiber Communications: Principles and Systems, McGraw-Hill, 2006. 5. M.Ilyas, H.Mouftah, Optical communication Networks, CRC Press, 2003. 6. 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* | |
| G.P. Agrawal: Fiber-Optic Communication Systems, John Wiley, 2010. | | 1 | | 20 |
| J.M. Lopez-Higuera (editor): Optical Fibre Sensing Technology, John Wiley & Sons, 2002. | | 1 | | 20 |
| R. Ramaswami, K.N. Sivarajan, G.H. Saski: Optical Networks: A Practical Perspective, 3rd ed., Elsevier, 2010. | | 1 | | 20 |
| J. Chesnoy: Undersea Fiber Communication Systems, Academic Press, 2002. | | 1 | | 20 |
| J.P.Dakin, Handbook of Optoelectronics, Taylor&Francis Group, 2006. | | 1 | | 20 |
| Bažant, A. i dr.: Telekomunikacije - tehnologija i tržište, Element, Zagreb, 2007. | | 1 | | 20 |
| Bažant, A. i dr.: Osnovne arhitekture mreža, Element, Zagreb, 2014. | | 1 | | 20 |
| Reading material available on e – learning system - Merlin (https://moodle.srce.hr) | | - | | 20 |
| *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. | | | | |