**Course description**

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| **Generic information** |
| Head of Course | PhD Svjetlana Hess |
| Course | Queuing Theory |
| Study Programme | Technology and Organization of Transport |
| Type of Course | Optional |
| Year of Study | 2. |  |
| Estimated Student Workload and Methods of Instruction | ECTS coefficient of Student Workload | 6 |
| Number of Hours (L+E+S) | 30+0+10 |

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| **1. GENERAL COURSE DESCRIPTION** |
| *1.1. Course Objectives*  |
| The main objective of the course is to enable students to apply the theory of queues, through the adoption of techniques and obtaining solutions, manually and with computer support, as well as comprehensive analysis of results that will result in planning real service processes in transport, service and logistics activities. |
| *1.2. Prerequisites for Course Registration*  |
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| *1.3. Expected Learning Outcomes*  |
| 1. describe and interpret the basic principles and theoretical settings of the queueing theory
2. define a specific problem in a certain service activity and determine the criteria and manner of making a decision
3. collect data, define the basic parameters of the queue and determine the appropriate type of queue
4. solve illustrative problems for different types of queues applying appropriate formulas
5. choose the optimal solution with regard to the criteria, then interpret the solution and the interdependence of the obtained indicators
6. use computer support to get results
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| *1.4. Course Outline*  |
| The concept and types of queues (mass service systems). Basic parameters and indicators of the functioning of the queuing system. Analysis of the interdependence of service system indicators. Influence of queuing system parameters on system operation efficiency. Waiting cost model. Case studies of different types of queues. The emphasis is on the application of the queuing theory to specific practical problems in transport and logistics, where queue optimization is required.. |
| *1.5. Modes of* *Instruction*  | [x] Lectures[x]  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*  |
| Colloquia and assignments, continuous assessment during classes and final exam. |
| *1.8. Assessment1 of Learning Outcomes*  |
| Course attendance | 1.5 | Class participation |     | Seminar paper | 2 | Experiment |     |
| Written exam | 1 | Oral exam |     | Essay |     | Research |     |
| Project |     | Continuous Assessment | 1.5 | Presentation |     | Practical work |  |
| Portfolio |     |  |     |  |     |  |     |
| *1.9. Assessment of Learning Outcomes and Examples of Evaluation during Classes and on the Final Exam*  |
| *Evaluation procedure is following:* 70% of the grade through exams for students' continuous assessment and 30% of the grade through final exam ie:- continuous assessment through the preparation of seminar under mentorship and one colloquium,- the final exam checks the integrity of theoretical knowledge and understanding of specific knowledge in the field of queuing theory with application to specific cases in transport and logistics.*Valuation examples by individual learning outcomes:*1. write the theoretical settings for one of the queue types2. select and verbally formulate an arbitrary problem in a certain service or traffic activity with the determination of appropriate criteria3. for a problem from practice, describe the method of data collection, define the input parameters and determine the appropriate type of queue for solving and finding the optimal solution4. solve a particular queue problem by applying the appropriate formulas for that queue type5. interpret the solution with respect to the set criteria, analyze the interdependence of the obtained indicators and explain the impact of input parameters on the efficiency of the service system6. solve the practical queuing problem with computer support |
| *1.10. Main Reading*  |  |  |
| * Lectures posted as teaching text on the website (Merlin)
* Zenzerović, Z., Teorija redova čekanja, Stohastički procesi II. dio, autorizirana predavanja, Pomorski fakultet u Rijeci, Rijeka, 2003.
* Barković, D., Operacijska istraživanja, Sveučilište u Osijeku Ekonomski fakultet Osijek, Osijek, 2001.
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| *1.11. Recommended Reading*  |  |  |
| * Queueing Theory Books On Line (<http://web2.uwindsor.ca/math/hlynka/qonline.html>)
* Sztrik, J., Basic Queueing Theory: Foundations of System Performance Modeling, 2016, <https://irh.inf.unideb.hu/~jsztrik/education/16/SOR_Main_Angol.pdf> ili <https://www.freetechbooks.com/basic-queueing-theory-foundations-of-system-performance-modeling-t1083.html>
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| *1.12. Number of Main Reading Examples*  |  |  |
| *Title*  | *Number of examples*  | *Number of students*  |
| Zenzerović, Z., Teorija redova čekanja, Stohastički procesi II. dio, autorizirana predavanja, Pomorski fakultet u Rijeci, Rijeka, 2003. | 10 | 25 |
| Lectures posted as teaching text on the website (Merlin) | web | 25 |
| Barković, D., Operacijska istraživanja, Ekonomski fakultet, Osijek, 2001. | 5 | 25 |
| *1.13. Quality Assurance*  |
| The studying quality is monitored following the ISO 9001 system, as well as European standards and guidelines for quality assurance, carried out at the Faculty of Maritime Studies, University of Rijeka. Analysis of exam passing is done once a year, and once a semester a survey is conducted among students. |

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.