# RTU Course "Teletraffic Theory"

**13104 null**

*General data*

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| Code | RAE555 |
| Course title | Teletraffic Theory |
| Course status in the programme | Compulsory/Courses of Limited Choice |
| Responsible instructor | Andis Supe |
| Academic staff | Viktors Zagorskis<br>Jurģis Poriņš |
| Volume of the course: parts and credits points | 1 part, 3.0 Credit Points, 4.5 ECTS credits |
| Language of instruction | LV, EN |
| Annotation | The study course covers the experimental systems in relation to telecommunications network systems. Within the framework of the study course students will discuss the network management and control methods. Students will be enabled to promote their understanding of the performance of real systems. Important part of the course is evaluation methods as well as current trends and problems in the context of Internet, mobile and broadband communications. |
| Goals and objectives of the course in terms of competences and skills | The aim of the study course is to provide knowledge about the theoretical aspects of mass service systems and applicable tools for solving problems in the field of telecommunications.<br>The tasks of the study course are:<br>1. To develop skills to choose network simulation methods and tools and to justify the choice, to perform simulation and evaluate the obtained results.<br>2. To develop the ability to identify keywords and basic algebraic relationships in simple service models.<br>3. To demonstrate and develop scientific capacity using probability models.<br>4. To develop skills to solve problems of telecommunication services using Markov models;<br>5. To create an idea about Petri nets through discrete stochastic processes. |
| Structure and tasks of independent studies | Students use interactive online learning resources, as well as supplementary materials offered and created during the study course. The focus is put on the usage and analysis of the study materials from the leading worldwide universities. To evaluate results and control students' independent studies, study course staff periodically organizes seminars on homework, online tests, and semester stage assignments. |
| Recommended literature | Obligātā/Obligatory:<br>1.Adan, I. and Resing, J. “Queueing Theory”, Department of Mathematics and Computing Science, Eindhoven University of Technology, 2015, 182 p.<br>2.Haddad. S. and Pomello, L. (Ed) “Application and Theory of Petri Nets”, 33rd International Conference PETRI NETS 2012 Proceedings, June 25-29, Hamburg, Germany, 2012, 418 p.<br>3.Yue, W., Takahashi, Y. and Takagi, H. (Ed) “Advances in Queueing Theory and Network Applications”, Springer, 2009, 315 p.<br>Citi informācijas resursi/Other information resources:<br>1.https://www-dssz.informatik.tu-cottbus.de/DSSZ/Software/Snoopy |
| Course prerequisites | Teletraffic theory and distributed communication systems. |

*Course contents*

| Content | Full- and part-time intramural studies | | Part time extramural studies | |
|---|---|---|---|---|
| | Contact Hours | Indep. work | Contact Hours | Indep. work |
| Introduction. Objectives, tasks, methodology of the study course, learning outcomes. | 1 | 0 | 0 | 0 |
| Problem statement. Overview of mode-driven architecture methodology: metamodels and models for telecom systems. | 5 | 8 | 0 | 0 |
| Traffic engineering: Overview of tasks, methods, tools and decision making methodology. | 4 | 6 | 0 | 0 |
| Traffic models: modeling, simulation, analysis and forecasting. | 6 | 8 | 0 | 0 |
| Routing algorithms: models, methods, simulation and evaluation of simulation results. | 4 | 6 | 0 | 0 |
| Queueing and Scheduling: algorithms and evaluation of algorithms. | 4 | 10 | 0 | 0 |
| Management and control of network resources: methods and their evaluation. | 4 | 6 | 0 | 0 |
| Admission Control in packet networks. | 4 | 8 | 0 | 0 |
| Traffic measurements: problem description, tasks, tools and methods of data preprocessing. | 4 | 6 | 0 | 0 |
| Data mining in traffic engineering: tasks, methods, tools and results. | 4 | 8 | 0 | 0 |
| Knowledge management in traffic engineering. | 6 | 6 | 0 | 0 |
| Conclusions. Advanced Topics. | 2 | 0 | 0 | 0 |
| Total: | 48 | 72 | 0 | 0 |

*Learning outcomes and assessment*

| Learning outcomes | Assessment methods |
|---|---|
| Understands and can practically apply traffic analysis, simulation, and prediction methods. | Assignments. Criterion: 1) not submitted; 2) formally submitted but the contribution is insufficient; 3) contribution matches expectations; 4) contribution exceeds expected results and quality. |
| Is capable to study queueing algorithms in depth and independently develop the solutions for actual problems in the telecommunications domain. | Assignments. Criterion: 1) not submitted; 2) formally submitted but the contribution is insufficient; 3) contribution matches expectations; 4) contribution exceeds expected results and quality. |
| Can choose the appropriate data mining method for a given teletraffic problem, obtain the necessary data, and analyze the results. | Course project. Criterion: 1) not submitted; 2) formally submitted but the contribution is insufficient; 3) contribution matches expectations; 4) contribution exceeds expected results and quality. |
| Can show a holistic picture of the capabilities and skills in the context of a given course by demonstrating the results achieved during the course online or in the class. | Exam. Criterion: 1) unattended; 2) formally participated but the contribution is insufficient; 3) contribution matches expectations; 4) contribution exceeds expected results and quality. |

*Evaluation criteria of study results*

| Criterion | % |
|---|---|
| Assignments | 30 |
| Course project | 30 |
| Exam | 30 |
| Academic excellence | 10 |
| Total: | 100 |

*Study subject structure*

| Part | CP | Hours per Week | | | Tests | | |
|---|---|---|---|---|---|---|---|
| | | Lectures | Practical | Lab. | Test | Exam | Work |
| 1. | 3.0 | 2.0 | 1.0 | 0.0 | | * | |