RIGA TECHNICAL UNIVERSITY

FACULTY OF ELECTRONICS AND TELECOMMUNICATIONS

Please note! This is a preliminary list of courses. Changes may occur!

AUTUMN SEMESTER
BACHELOR COURSES

RDE708 Telecommunications Systems
6.00 CP (9 ECTS)
The course in the telecommunication systems give an idea and a basic understanding of the various types of wired, wireless and fiber optic transmission systems and their main switching elements. The course examines the history of the development of telecommunications systems in the world, in Latvia and future trends. Laboratory and practical work with engineering prototypes of the telecommunications system is also planned.

RAE361 Digital Devices of Telecommunications Systems 3.00 CP (4.5 ECTS)
Addressing modes in processor systems. Systems of commands of one-byte microprocessors and programming basics. Floating comma number formatting and the subprocessor. External memory and its addressing and protection. Pipeline processing commands and the data. Alarm processors, their use.

RAE306 Digital Switching Systems 4.00 CP (6 ECTS)
Introduction to telecommunication systems and services. Basics of digital circuit switching, time and space switches. Digital networks: component and multiplexing systems, main types of lines and trunks. Digital switching systems: comparison of EWSD and S12. Basics of packet switching and transmission. Difference between circuit and packet switching. Open system interface. ATM. Compromise between circuit and packet switching.

RDE704 Introduction to Electronics and Telecommunications Branch PART 2 1.00 CP (1.5 ECTS)
The course is intended for the first year students studying at academic bachelor study programmes of the Faculty of Electronics and Telecommunications. It contains information on Riga Technical University (RTU) and the Faculty of Electronics and Telecommunications, study programmes and organization of studies, memory features and active learning, as well as topics from the history of telegraph, telephone and radio. Within the framework of the course the following topics will also be covered: the history of development of telecommunications and electronics, different signal modulations and code methods, methods used in analogue/digital television and radio broadcasting.

RDE302 Transmission Media PART 1 and 2 6.00 CP (9 ECTS)
Communication line design. Classification of cable, insulating materials, protective covers. Electromagnetic processes in symmetrical, coaxial cable, waveguides. Design optimization. Electromagnetic compatibility. Mutual influence, rationing, protection. Shielding theory. Corrosion. Line construction, design, operation. The course includes both theory and communication lines measurements in the laboratory study. The international standards relating to the use of communication lines have been dealt with. Students are prepared both for practical work with lines of communication, and further studies in Master Course.

RAE362 Digital Devices and Systems 3.00 CP (4.5 ECTS)
Pulse signals and their impact on linear electrical circuits. Pulse signals transformer. Digital switches. Logic families, their parameters and electrical structures. Limiters. Pulse generators. Analogue and digital comparators. Digital to Analogue and Analogue to Digital Converters. Timers. Computer memories. Computer internal and external interfaces.

RAE202 Computer Technologies in Telecommunications 3.00 CP (4.5 ECTS)

Global information transmission networks. Open systems. Concept of interworking. Control systems. Distributive and centralized control. Real-time execution. Processing and distribution of information. Network management. Maintenance. Designing. SDL. Databases. Datamodels, Data structures. Specifications. Relation DB. Statistical modelling.

TRT215 Fundamentals of Circuit Theory 3.00 CP (4.5 ECTS)

Resonances in RLC series and parallel network. Time-domain response of first-order and secondorder circuits. The Laplace transform and the convolution. State variable analysis. Two-port networks: equations, matrices, connections.

RAE261 Digital Electronics and Computer Architecture 3.00 CP (4.5 ECTS)

Types of electrical signals. Arithmetic and algebra of binary counting system. Logic algebra and its functions. Minimization of logical functions. Combinational logic circuit analysis and synthesis. Sequential logic basic elements. Basic structure of computers, general concepts: algorithm, command, program, operand, address, operational system, computer memory, central processor, arithmetic-logic-unit.

TRT441 Computer Technologies in Research 3.00 CP (4.5 ECTS)

The course acquaints students with application possibilities of modern computer technologies in research in engineering sciences. The areas of use of popular application packages and their features are considered. The main attention is paid to mastering of universal mathematically oriented packages MathCad and MATLAB.

MASTER COURSES
for students in electronics and telecommunications study programmes

RDE703 Microwave Telecommunications Systems *(graduate)*

5.00 CP (7.5 ECTS)

Topics include microwave propagation, radio communication, attenuation factor, radio link components: antennae, feeder, receiver and transmitter; analogue and digital radio systems, noise immunity, communication stability and grade of service, satellite and mobile systems, short range radio systems for telephone communication.

RDE432 Transmission Systems (special course) *(graduate)*

4.00 CP (6.00 ECTS)

The course deals with transmission systems (TS) at an advanced level. It includes the theoretical analysis of TS, as well as their practical implementation. In the laboratory students are trained in the practical skills in the area of TS. The following topics are discussed: noise and its influence on transmission quality, regeneration of digital signals, baseband line codes, passband line codes, clock extraction and timing, xDSL technologies.

RDE419 Fibre Optic Transmission Systems *(graduate)*

5.00 CP (7.50 ECTS)

Topics covered include FOTS element classification, optical fibre, cables, manufacturing, parameter system, loss mechanism, optical connections, optical waveguide electrodynamics, irradiating and receiving modules, multiplexers, demultiplexers, parameter measurements, optical sensors. International standards related to optical communication systems are discussed. Students are prepared both for practical work with optical elements and further studies at doctoral study programmes.

RAE411 Telecommunications Software *(graduate)*

4.00 CP (6.00 ECTS)

Since in the field of the telecommunications today more and more software is built on the Java platform-independent language base, the telecom professionals need to know the Java language basics - that is the nature of technology, its application areas, language syntax, the key programmatic solutions, and the main technical solutions to hardware. The course covers the diverse range of networking tasks, which include a server-client applications, and traffic reading/generation operations with Java technology, as well as J2ME technology solutions, which allow you to create interactive applications for mobile devices.

The given course provides students with the skills necessary to build Java SE applications and applets as well as Java ME MIDlets.

RAE555 Teletraffic Theory *(graduate)*
3.00 CP (4.50 ECTS)
The course covers the experimental systems in relation to telecommunications network systems. Within the framework of the 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.

RDE701 Telecommunications Theory (special course) *(graduate)*
5.00 CP (7.50 ECTS)
Electric communication theory (special course) for M.Sc.students of RTU is intended to deepen their knowledge of signal sampling and approximation, of linear system theory basing on entire analytic function theory, as well as of other communication technology theoretical problems. Theory of entire analytic functions is a valuable tool in communication theory and practice because entire analytic functions in the complex plane correspond to the functions with limited spectra on the real axis.The latter are just functions which describe signals transmitted over the bandlimited communication channels. In this way it turns out that the well known sampling (Kotelnikov) theorem is merely the special case of Lagrange's interpolation formula of entire analytic functions enabling also other sampling possibilities including nonuniform sampling. Similiarly, other new possibilities appear in signal approximation and in approximation error evaluation, as well as in signal restoration if only a partial information about the signal is known.Signal multiplexing in CDMA systems and the main branches of quantum information including quantum communications (mainly quantum cryptography) and quantum computers.The following main topics are covered in this special course: entire analytic functions and their application insignal sampling, approximation and restoration; properties of Fourier transform; signal mutiplexing in multichannel systems, CDMA systems; the negentropy principle of information and its meaning for telecommunications; the influence of quantum effects on signal transmission; quantum communications; quantum cryptography; quantum computers; stochastic resonance.

RAE473 Computer Technologies in Telecommunications *(graduate)*
3.00 CP (4.50 ECTS)
The objective of the course is to enable students to construct software by means of systematic object-oriented analysis and design. The course covers the methods for object-oriented analysis and modelling of application domains and software systems. The analysis includes description of objects and their structuring and functional specifications. The design will include the system modelling with layering and partitioning.

RDE417 Physics of Optical Information Processing *(graduate)*
4.00 CP (6.00 ECTS)
The course is designed to introduce students to the fundamentals of optoelectronic and optical communications. Topics cover waveguide optics, nanophotonics, metamaterials, holography, optical information processing, laser technology and nonlinear optics, atmospheric laser communications, FOTS information multiplexing and computer simulation.

RDE410 Design and Maintenance of Telecommunications Networks *(graduate)*
4.00 CP (6.00 ECTS)
The course deals with projecting of transmission systems. Students identify and define tasks, structure, and content of a project. Topics include principles of electricity supply and powering, maintenance tasks and management, parameters and methods, condition, control means and parameters of communication systems, remote control systems.

RDE425 Research Seminars part 1 *(graduate)*
2.00 CP (3.00 ECTS)
Scientific workshops cover the following themes: presentation and discussion of the problems in the next generation telecommunications networks based on the analysis of the scientific literature, presentation and discussion of MSc analytical and experimental research results, the latest reviews on communications and measurement methodology, the latest telecommunications software for the analysis and their application reviews, taking part in scientific seminars, and work on the master thesis discussions.

RAE553 Signalling Systems and Protocols *(graduate)*

3.00 CP (4.50 ECTS)
The rapid development of telecommunications branches required specialists, who would be able to analyse current situation, forecast development directions, make long-term responsible solutions about favourable signalling/protocol system selection. The course provides students with the necessary skills for working in the sphere of signalling and communications protocols. Aspects of compatibility, scalability and security are emphasized. Message formats, time and state diagrams of protocols are analysed. Work with protocol analysers in emulation environment provides students with necessary skills for solving problems and preparing for changes in configuration. Within the framework of the course, students are acquainted with fundamental telecommunications signallings and protocols, analyse its historical development with some essential drawbacks, expand their personal vision for future task solutions in future.

RAE541 Encoding and Encryption *(graduate)*
4.00 CP (6.00 ECTS)
Characteristics of codes. Simple codes for error detection and error correction. Prefix and suffix codes. Cyclic codes, swapped codes. Applications. Filtering of digital signals. Synchronizaton in TV and message transmission. Methods of encryption.