



Faculty of Electrical and Environmental Engineering

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

SPRING SEMESTER

BACHELOR COURSES For students in Electrical and Environmental Engineering study programs

EEP344 Power Electronics (*undergraduate*)

3.00 CP (4.50 ECTS)

The course deals with power electronic converters and their elements. The most important objects of the course are: general definitions and mathematical tools of power electronics, one-cycle and multi-cycle DC/DC converters, diode and thyristor rectifiers, autonomous inverters and some specific converters.

The course is concentrated on calculation of parameters of the power converters, choice of their passive elements and semiconductor switches, as well as on the cooling and protection of these switches. The course includes special lectures devoted to development of the power converter utilizing the corresponding modern integrated circuits. The practical part of the course includes numerically solved exercises, exercises of simulation of the power converters, laboratory exercises. The most active students are provided with opportunity to design, build and test one of the studied power converters utilizing one of the available integrated circuits.

https://info.rtu.lv/rtupub/disc2/printDiscEn.8125/EEP344_Power-Electronics.pdf

EEl481 Programming Technologies in Industrial Electronics (*undergraduate*)

3.00 CP (4.50 ECTS)

Classification of information systems. Intelligent systems of industrial electronics. Object-oriented design. Tasks of the intelligent systems. Solving algorithms. Technology of software design. Life cycle. Flowcharting of the programs. Structure analysis. Synthesis of the programs. Method of Jackson. Testing of software. Testing of basis way. Testing of conditions. Testing of data flux. Testing of cycles. Visual modeling. Object-oriented testing.

https://info.rtu.lv/rtupub/disc2/printDiscEn.8079/EEl481_Programming-Technologies-in-Industrial-Electronics.pdf

EEl345 Programming Technologies (study project) (*undergraduate*)

3.00 CP (4.50 ECTS)

Programming and preparation of the obtained systems of programming logic controllers, microcontrollers and microprocessors for the operation in automated electric technologic equipment.

[https://info.rtu.lv/rtupub/disc2/printDiscEn.17674/EEl345_Programming-Technologies-\(study-project\).pdf](https://info.rtu.lv/rtupub/disc2/printDiscEn.17674/EEl345_Programming-Technologies-(study-project).pdf)

EEP342 Application of Computers in Electrical Equipment Design (*undergraduate*)

2.00 CP (3.00 ECTS)

The students are taught a electronic hardware design phases, described the software "ORCAD" and how they will be forced to realize all the broad stages of design.

https://info.rtu.lv/rutupub/disc2/printDiscEn.8123/EEP342_Application-of-Computers-in-Electrical-Equipment-Design.pdf

EEI720 Autonomous Robotic System (course project) (*undergraduate*)

2.00 CP (3.00 ECTS)

Autonomous robotic system structure, operating principles and applications. Energy sources and energy efficiency. Robotic system options. Small autonomous robotic system design.

[https://info.rtu.lv/rutupub/disc2/printDiscEn.30471/EEI720_Autonomous-Robotic-System-\(course-project\).pdf](https://info.rtu.lv/rutupub/disc2/printDiscEn.30471/EEI720_Autonomous-Robotic-System-(course-project).pdf)

EEI714 Elements of Adaptive Systems (*undergraduate*)

4.00 CP (6.00 ECTS)

The study course gives insight on fundamental components of adaptive systems as well as on design principles and control methods of adaptive systems.

https://info.rtu.lv/rutupub/disc2/printDiscEn.30399/EEI714_Elements-of-Adaptive-Systems.pdf

EEI710 Theory of Electrical Drive Systems (*undergraduate*)

5.00 CP (7.50 ECTS)

Electro-mechanical transmission of electric energy The principle of construction of the electric machines and the theoretic questions of the operation in stationary and transient regimes are considered, the properties of the machines operation regimes and maintaining and application are analyzed. Elements of electric drives, mechanics, equation of motion. Characteristics of actuating mechanisms. The systems of electric drives speed regulation and control with the power electronic converters, regulation characteristics. Transient processes and power engineering questions. Control methods of electric drives.

https://info.rtu.lv/rutupub/disc2/printDiscEn.30056/EEI710_Theory-of-Electrical-Drive-Systems.pdf

MASTER COURSES For students in Electrical and Environmental Engineering study programs

EEP574 Commutated Converters Part 1 and Part 2 (*graduate*)

5.00 CP (7.50 ECTS)

Transistor switches, control drivers, thyristors switches, control schemes, forming of transient process, commutation of DC, DC-pulse regulators, current-source and voltage-source inverters, control systems, action with electrical motors, programmable numerical control.

https://info.rtu.lv/rutupub/disc2/printDiscEn.8154/EEP574_Commutated-Converters.pdf

EEP345 Unconventional Systems of Energy Conversion and Accumulation (*graduate*)

3.00 CP (4.5 ECTS)

Wind power stations, turbines, adjusting, connections to the Main, small power hydraulic plants, its adjusting, electric machines of the special construction, photovoltaics, piezo generators, piezo motors, motion and movement sensors, low voltage inverters, adjusting, regulation, batteries, UPS.

https://info.rtu.lv/rutupub/disc2/printDiscEn.8126/EEP345_Unconventional-Systems-of-Energy-Conversion-and-Accumulation.pdf

EEP504 Microprocessors - based Automation Systems (*graduate*)

3.00 CP (4.50 ECTS)

The course has been composed for any student who has elementary knowledge in the field of electrical engineering and programming and wish to gain basic practical skills of utilization of microcontrollers MSP430. The course briefly discusses basic design features of microcontrollers MSP430 in the context of various architectures of microprocessors, microcontrollers and peripheral devices. The most significant part of the course is devoted to the programming of MSP430 – including the programming of digital I/O, watchdog and arithmetical operations. The course is based on practical studies and assumes active individual training of the students in the laboratory or at home.

https://info.rtu.lv/rtupub/disc2/printDiscEn.8147/EEP504_Microprocessors---based-Automation-Systems.pdf

EEP585 Simulation of Electrical Processes (*graduate*)

5.00 CP (7.50 ECTS)

The subject is devoted to simulation of electrical circuits. Principles of composing of differential equation systems for electrical equipment, of their numerical calculation, and its features in MATLAB are given in the first significant part of the course. The second part is devoted to PSPICE circuit description language and to the features of its practical utilization. The theoretical part of the course deals with solutions of ordinary differential equation systems and basics principles of PSPICE. The practical (most important) part of the course includes various examples of simulation of electrical equipment.

https://info.rtu.lv/rtupub/disc2/printDiscEn.8165/EEP585_Simulation-of-Electrical-Processes.pdf

EEP584 Theory of Electronic Converters of Electrical Energy (*graduate*)

4.00 CP (6.00 ECTS)

General theory of energy conversion. Rectifiers and line-frequency controlled inverters. Autonomous inverters. Current-source, voltage-source and resonance mode inverters. Modulation methods. BUCK and BOOST converters. Frequency converters with high-frequency links. Matrix type converters. Cycloconverters.

https://info.rtu.lv/rtupub/disc2/printDiscEn.8164/EEP584_Theory-of-Electronic-Converters-of-Electrical-Energy.pdf