Faculty of Electrical and Environmental Engineering

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

SPRING SEMESTER

BACHELOR COURSES
Study programme "Electrical Engineering"

Code	Course name	CP	ECTS
EEE101	**Electricity and Magnetism**	**2.0**	**3.0**
The study course considers classical basics of the theory of electromagnetic field, based on the conclusions of relativity theory. Particular examples represent opportunities of engineering calculations for the cases of static and variable in time electric and magnetic fields.			
EEI348	**Programming Technologies (study project)**	**2.0**	**3.0**
The study course is dedicated to the development of microcontroller software project to control industrial electronics system using programming technologies. The study course practically shows how it is possible to facilitate and accelerate the development of the system from the concept to the completed software using standardized approaches to the embedded software development process in general and for specific engineering stages.			
EEP342	**Application of Computers in Electrical Equipment Design**	**2.0**	**3.0**
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.			
EEI710	**Theory of Electrical Drive Systems**	**5.0**	**7.5**
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.			
EEI352	**Programming languages**	**3.0**	**4.5**
The study course is dedicated to the basic concepts and basic constructions of programming languages and to obtaining programming skills. The study course includes techniques for algorithms processing into program code, i.e. basic data types, operators, functions, conditional and loops instructions that are common to several different programming languages, and also show object-oriented and procedural programming principles and programming language features. Examples and tasks to obtain basic programming skills are done in C ++ programming language, that is a predecessor for various derived languages such as Java, PHP, Perl, C #, Swift, etc. and which is also widely used in the programming of microcontrollers and embedded systems.			
EEI726	**Electrical Measurement Basics**	**3.0**	**4.5**
Within the study course, the student's knowledge about the electrical circuit measurement process, methods, evaluation and processing of results is created and developed, as well as knowledge about the development of a simple electricity measuring device is provided.			
EEE215	**Theory of Circuits**	**5.0**	**7.5**
Within the study course, the student will learn non-linear circuit analysis of electrical engineering and various calculation methods and their application in the calculation of electrical circuit modes. The study course acquaints students with transient processes both in linear circuits with concentrated parameters and in long lines.			
EEI213	**Electrical Drives (Study Project)**	**2.0**	**3.0**
DC electric drive characteristics and calculation of the electric drive for mechanism including its drive operating mode calculations, principal circuitry creation, parameter estimation. AC electric drive characteristic calculation, the electric drive creation for mechanism of the project, including creation of the work estimates, the principal circuitry and parametric calculations.			

EEI729	Power Electronics	4.0	6.0

The study course deals with power electronic converters and their elements. The most important objects of the study 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 study 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 study course includes special lectures devoted to development of the power converter utilizing the corresponding modern integrated circuits. The practical part of the study 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.

RRI598	Analysis of Biological Signals	5.0	7.5

The study course introduces students to continuous and digital signal characteristics and signal analysis methods, as well as phenomena and processes in biological objects. Students acquire knowledge about the basics of digital signal processing, methods of time-frequency analysis, signals bounded in time or frequency domain. The course enables students to apply the acquired knowledge both in medical physics and biological signal processing.

EEM305	Electrical Machines	5.0	7.5

The study course covers the principles and constructions of electrical machines and transformers, theoretical issues in stationary and transient processes are considered, as well as their operating modes and operating properties are analysed.

EEM732	Numerical Methods for Computerization of Tasks in Electrical Engineering	2.0	3.0

The goal of this study course is to provide an insight into the role of numerical methods and their computerization for solving typical tasks in the field of electrical engineering. Numerical methods for solving differential equations, complex roots of non-linear equation, numerical differentiation and integration etc. are included. The course provides students with the skills to define problems, to evaluate the input data, to select a suitable solving method and to draw conclusions about the accuracy of the obtained results, as well as the skills to implement numerical methods for calculations by which to improve process management and to perform analysis of various transient processes.

EES225	Basic Signal Theory	3.0	4.5

The study course is intended for power engineering students and is focused on signals theory aspects, required for power systems design, control and fault protection. Fourier and Laplace transforms are concerned both in continual and discrete form, as required by circuit steady state and transient analysis, application of numerical Laplace transform is taken in conjunction with network topological analysis. Resonant circuits are presented to form a basis, required to understand related overvoltage problems of high voltage networks. Numerical filtration is mostly limited to power systems protection applications, such as orthogonal components and symmetrical components filters. In the area of modulated signals basic modes (AM, FM, PM) and power line carrier applications are presented, pulse width modulations applications in power electronics is concerned to. Systems with feedback and their stability are presented. Hilbert's transformation scope is limited by application for power control. Special aspects, related to polyphase networks, such as harmonics flow and modal transformations are specific to the study course.

EES744	Legal Framework for Energy Construction and Electricity Industries	1.0	1.5

The study course discusses the fundamental issues of the legal framework for energy construction and electricity industries, including:.1. Introduction to the regulation of Latvian laws and regulations regarding regulated professions in the field of power energy and related industries..; 2. Introduction to the general legal framework of the Latvian construction industry and protection zones, responsibility, competence, duties and rights of the parties involved in the construction process..; 3. A set of national and international regulatory enactments specific to the power energy industry, ensuring the design, construction, planning operation, development planning of networks and production facilities..; 4. Application of technical standards, industry standards, national and international building codes and opportunities for participation in their preparation.

EEI714	Elements of Adaptive Systems	4.0	6.0

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

EEI720	Autonomous Robotic System (course project)	2.0	3.0

Within the study course, the student develops skills to analytically define the structure of an autonomous robotic system and its nodes in the context of operational tasks, energy efficiency, and impact on the environment.

Note! Full course description available by clicking on the course code!