

## 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
<a href="#"><u>EEP344</u></a>	<b>Power Electronics</b>	<b>3.0</b>	<b>4.5</b>
<p>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.</p>			
<a href="#"><u>EEI481</u></a>	<b>Programming Technologies in Industrial Electronics</b>	<b>3.0</b>	<b>4.5</b>
<p>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.</p>			
<a href="#"><u>EEP342</u></a>	<b>Application of Computers in Electrical Equipment Design</b>	<b>2.0</b>	<b>3.0</b>
<p>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.</p>			
<a href="#"><u>EEI710</u></a>	<b>Theory of Electrical Drive Systems</b>	<b>5.0</b>	<b>7.5</b>
<p>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.</p>			
<a href="#"><u>EES263</u></a>	<b>Basics of Electric Power Engineering</b>	<b>3.0</b>	<b>4.5</b>
<p>World's electrical power engineering. Energy production and transmission. Alternative power engineering development. Environmental problems of power engineering. Possibility to minimize ecological influence of power engineering. Electrical power systems, protection of system elements. Power system control during normal and emergency conditions. Communications in the power system. Improvement of energy consumption effectiveness taking into consideration economical and environmental means.</p>			
<a href="#"><u>EES262</u></a>	<b>Digital Electronics and Computer Architecture</b>	<b>3.0</b>	<b>4.5</b>
<p>This study course explores the theory and operation of the basic building blocks of digital electronics. Students examine number systems, Boolean algebra, logic functions and gates, logic function minimization techniques, decoders, encoders, multiplexers, arithmetic circuits, latches, flip-flops, counters, and shift registers. The basic structure of the microprocessor-based devices will be presented and explained on a Programmable Logic Controller (PLC) example. PLC architecture, hardware modules, operating principles and PLC programming examples will be presented during the course.</p>			
<a href="#"><u>EEE215</u></a>	<b>Theory of Circuits</b>	<b>5.0</b>	<b>7.5</b>
<p>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.</p>			
<a href="#"><u>EEI213</u></a>	<b>Electrical Drives (Study Project)</b>	<b>2.0</b>	<b>3.0</b>
<p>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.</p>			

<a href="#">EEI354</a>	<b>Adaptive Systems in Industrial Electronics</b>	<b>3.0</b>	<b>4.5</b>
Study course is devoted to adaptive systems that automatically adjust themselves to outside conditions and changes of electric or electro-mechanic control object, changing structure and parameters of control device providing necessary quality of control. Within the study course main features of the adaptive system are the possibilities of embedded systems for self-organization, self-learning and self-regulation with the use of fuzzy logic, associative memory, neural networks and other methods, solving the tasks of extreme control and optimization, automation control as well as searching, recognition, classification, clasterization tasks are studied.			

<a href="#">RRI598</a>	<b>Analysis of Biological Signals</b>	<b>5.0</b>	<b>7.5</b>
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.			

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

**MASTER COURSES**  
**Study programme “Electrical Engineering”**  
**(available only to graduate students)**

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

Code	Course name	CP	ECTS
<a href="#">EEP574</a>	<b>Commutated Converters Part 1 and Part 2</b>	<b>5.0</b>	<b>7.5</b>
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.			

<a href="#">EEP345</a>	<b>Unconventional Systems of Energy Conversion and Accumulation</b>	<b>3.0</b>	<b>4.5</b>
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.			

<a href="#">EEP582</a>	<b>Control Technique with Microprocessor Controllers</b>	<b>3.0</b>	<b>4.5</b>
The technologic process continuous automatic control systems are studied. The basic principles and the necessary control elements for closed loop control are studied. The regulator programming for system optimum operation is studied.			

<a href="#">EEP583</a>	<b>Industrial Frequency Converters and Inverters</b>	<b>2.0</b>	<b>3.0</b>
The study course provides a historical overview of AC drive system development. Mechanical and electrical characteristics of DC and AC drive systems with different speed control methods are discussed. Variable frequency AC drives, typical applications and characteristics are analysed. Various pulse width modulation techniques for inverters and frequency converters are discussed. Scalar and field-oriented control methods of frequency converters are analysed.			

<a href="#">EEP408</a>	<b>Automated Electrotechnological Processes</b>	<b>2.0</b>	<b>3.0</b>
The study course reviews the design principles of electrotechnological processes automation systems. Students acquire the basic principles of electrotechnological processes. Students are executing the computer simulation of automation systems for electrotechnological processes.			

<a href="#">EEP458</a>	<b>Typical Electrical Drive</b>	<b>5.0</b>	<b>7.5</b>
The realization of typical electric drives for different essential groups of mechanisms: cranes, lifts, conveyers, pumps, compressors, fans, excavators and machine-tools. Calculation of the drives. The dynamic loads, transient processes. Braking processes. Adjusting of efficiency of the mechanisms, modes of automation systems and schemes for control of typical electrical drives.			

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