Syllabus

Electrical Engineering

Electrical Engineering, Automatics, Computer Science and Electronics	**Field of study:**	Electrical engineering
	Specialization:	Electrical engineering
	Level of study:	master
	System of education:	stationary

Spring or/and Fall semester

Course obligatory / optional				**ECTS points**: **6**			
Semester	No. of hours	L	**C**	P	Lab	Seminar	Completion/Exam
Spring	**45**		**15**				**C**
Fall	**45**		**15**				**C**

Course content (Lecture)

Spring or/and Fall semester

Instantaneous power in electrical circuits. Active power.
First and second Kirchhoff's laws. Thevenin's principle.
DC circuits. Magnetic circuits. Permanent magnets. Ampere's law.
Transient and steady state in R+L circuits.
Transient and steady state in R+L+C circuits.
Laplace transform.
Overload circuit with L+C+D (Diode). Switching off of thyristor.
Transients in R+L+C circuits.
AC (Alternating Current) circuits. Active, reactive and apparent power.
Symbolic method. Phasor diagrams.
Series and parallel resonance.
Three-phase circuits. Wye and delta configuration. Power.
Three-phase transformers. Saturation and hysteresis.
Measuring instruments.
Ammeter, voltmeter and wattmeter for DC and AC applications.
Electromagnetic energy conversion.
Synchronous machines: motors and generators. Phasor diagram.
Induction machine. Steady-state torque versus speed characteristics.
Power electronic elements. Static converters for speed adjustable drives.
Capacitor motor. Induction servo motor.
Commutator machines. Series, shunt and separate excitation.
AC commutator motors. Brushless DC motors.
Stepping motors. Angular and frequency characteristics.
Speed and positions indicators. Resolvers. Encoders.
Piezoelectric motors and actuators.

Course content (Classes)

Spring or/and Fall semester

Calculating of active power.
Establishing and solving Kirchhoff's equations.
Analysis of magnetic circuits with permanent magnets.
Calculating transients in DC circuits with R+L, R+C and R+L+C.
Analysis transients in circuits with power electronics elements.
Applications of symbolic method.
Solving circuits in resonance conditions.
Calculating of power in three-phase circuits.
Phasor-diagram based analysis of synchronous machines.
Analysis of induction machine properties, based on Kloss's formula.
Analysis of mechanical properties of separately excited DC motor.

References (Basic):

Erickson W.H. Nelson: Electrical Engineering. Theory and Practice. John Wiley & Sons, Inc. N.Y.

M. C. Kelley, B. Nichols: Introductory linear electric circuits and electronics. John Wiley & Sons, N.Y.

R. J. Smith, R. C. Dorf: Circuits Devices and Systems. John Wiley & Sons, Inc.

Expected learning outcome:	Understanding of electrical circuits
Language of instruction:	English
ERASMUS subject code:	
Prerequisites:	Basic knowledge of physics
Assessment method:	Assessment of tests
Unit:	AGH, Chair of Electrical Machines
Lecturer:	Jan Rusek
Lecturer (Classes / Laboratory):	Jan Rusek
Modified:	13.03.2009