

Course - title:	Electrical and electronics engineering I	Kod:	M201
Course - type:			
Course of studies:	IPEH		
Level:	I		
Type of studies:	full lenght		
Type of course:	30W, 15L		

Lecturer: **Antoni Szumanowski, prof. zw.dr hab. inż.**

Brief conspectus:	
Lecture:	<p>1 The electrostatic field. The phenomenon of electrostatic induction. Coulomb's law. The electric field strength definition. The definition of Electric Flux (Gauss law) . The definition of the voltage resulting from the work of the elementary charge displacement. The electric potential (energy of an electrical charge) and the voltage definition resulting from the work, per unit charge, of charge movement against to electric field between two different potentials. Equipotent surfaces . Electric displacement fields.</p> <p>2 Direct Current (DC) Circuits. The definition of an electrical circuit, current and electromotive force. The influence of the voltage source internal resistance on the output voltage in relation to its electromotive force . The dynamic definition of electrical current (dQ/dt). Types of electric conductors. Definition of electrical resistance and conductance. The definition of the electromotive force for DC circuits . Ohm's law for closed DC circuit . Parallel and series connections of resistance – total resistance. Kirchoff's circuits laws . The wye-delta and delta-wye transform. Methods of DC circuits parameters calculating. The superposition principle . Application of Kirchoff's laws for linear electrical circuits calculation. The loop analyzes of electric circuits . Types of capacitors. The definition of capacity. Series and parallel connections of capacitors – total capacity. The definition of electric field energy for capacitor . The definition of work and electrical power for DC circuits. The definition of electrical power and energy related to the instantaneous values of current and voltage. Passive elements in electrical engineering - real and ideal resistor, coil and capacitor.. The definition of transient response for the linear electrical circuit. Laws of commutation . Capacitor transient response- charging and discharging the capacitor.</p> <p>3 The magnetic field . Coulomb's law for the magnetic field. The magnetic field of the permanent magnet . The definition of the strength of the magnetic field. The magnetic moment . The electromagnetic field - magnetic field around the conductors with current . Maxwell's law . The magnetic field around the solenoid. The definition of the magnetic flux . The phenomenon of magnetic induction The magnetic materials . The definition of magnetic permeability . Non-linearity in the magnetic circuits - magnetic hysteresis. The Ampère's law - the magnetomotor force. The magnetic circuits and its analogy to a DC electric circuit . The influence of magnetic field on the conductors with current. Electrodynamics phenomena's between conductors with current . The phenomenon of electromagnetic induction - induced Electromotive force . The phenomenon of self-induction . Self inductance and mutual inductance in the magnetic circuit. The phenomenon of eddy currents . The magnetic field energy. The working load of electromagnet. Coil transient response.</p> <p>5 The definition of Alternating Current (AC) . The definition of the period and the frequency of the alternating waveform. AC circuit with resistance . The definition rms value of sinusoidal voltage and current. The average value of a sinusoidal current . AC circuit with inductance . The definition of inductive reactance . AC circuit with capacitance . The concept of capacitive reactance . AC circuit with resistance , inductance and capacitance connected in series way. The definition of phase shift. Triangle of impedance. Vector charts for the AC circuits . The electrical resonance in AC circuits . Circuit with resistance , inductance and capacitance connected in parallel way. The complex numbers representative of the AC circuits parameters . The electric power definition in AC circuits . The definition of electric momentary power . Active (real), reactive and complex (apparent) power . The triangle of power. The complex form of the apparent power . The electric power for ideals resistor inductor and capacitor in AC circuit. Power in AC circuits for ideal RLC elements connected in series way - graphic representation.</p> <p>6 The multi-phase alternating current circuits . Three-phase systems. The definition of voltages between line conductors and phase conductor to neutral voltage. Three-wire and four-wire circuits. Load of ideal three-phase power sources in the system connected in a wye (Y). The definition of source phases currents. The electrical power in three-phase circuits.</p>
Laboratory:	<ol style="list-style-type: none"> 1. The voltage and current measurments method for DC and AC circuits. The evaluation of resistance, inductance and capacitance. 2. The magnetic circuits parameters measurments. 3. Electric Power measurments for one phase and tree phase AC circuits 4. The power supliers :rectifiers and stabilizers 5. Amplifiers, feedback and rezonators. 6. The electrical method of temperture, displacement and velocity mesurmsnts