**Nazwa przedmiotu:**

Electric Circuits I

**Koordynator przedmiotu:**

Prof. Tadeusz Skoczkowski, Ph.D., El. Eng.

**Status przedmiotu:**

Obowiązkowy

**Poziom kształcenia:**

Studia I stopnia

**Program:**

Power Engineering

**Grupa przedmiotów:**

Wspólne

**Kod przedmiotu:**

ANW 113

**Semestr nominalny:**

2 / rok ak. 2009/2010

**Liczba punktów ECTS:**

3

**Liczba godzin pracy studenta związanych z osiągnięciem efektów uczenia się:**

**Liczba punktów ECTS na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich:**

**Język prowadzenia zajęć:**

polski

**Liczba punktów ECTS, którą student uzyskuje w ramach zajęć o charakterze praktycznym:**

**Formy zajęć i ich wymiar w semestrze:**

|  |  |
| --- | --- |
| Wykład: | 30h |
| Ćwiczenia: | 15h |
| Laboratorium: | 0h |
| Projekt: | 0h |
| Lekcje komputerowe: | 0h |

**Wymagania wstępne:**

Mathematics, Physics

**Limit liczby studentów:**

**Cel przedmiotu:**

To be able to use fundamental laws of linear electric circuits to solve electric dc ac circuits. Know how to analyse electric circuits containing independent and dependent sources using loop and nodal techniques. Know how to analyse electric circuits using additional techniques e.g. superposition, source transformation, Thevenin and Norton equivalent circuits. To get familiar with calculation of electric power and energy in dc and ac electric circuits. To be able to analyse first- and second order transient circuits. To understand variable-frequency performance of basic elements, resonant circuits and passive filters.

**Treści kształcenia:**

Basic concepts of electric field and magnetic field. Role of Electromagnetic Field Theory. Electromagnetic Field Quantities. Properties of Electrostatic Fields. Gausss Law. Conservation Law. Electric Potential. Electric Fields for a System of Charges. Capacitance. Dielectrics. Electric Flux Density. Electric Potential for a System of Charges. Electrostatic Energy. Magnetic Force. Magnetostatics in Free Space. Magnetic Vector Potential. Biot-Savart Law. Faradays Law of Induction. Time Harmonic Fields. Basic Electric Circuit Concept. System of Units. Basic Quantities. Circuit Elements. Analysis of Resistive Circuits. Element Constraints. Connection Constraints. Combined Constraints. Ohms Law. Kirchhoffs Laws. Single Loop Circuits. Single-Node-Pair Circuits. Circuits with Series Parallel Combinations of Resistor. Wye-Delta Transformation. Circuit Reduction. Equivalent Circuits. Voltage and Current Division.. Circuits with Dependant Sources. Resistors for Electronics. Computer-Aided Circuit Analysis. Loop and Nodal Techniques. Nodal analysis. Loop analysis. Additional Techniques. Superposition. Network. Linearity Properties. Thevenins and Nortons Theorems. Maximum Power Transfer. Signal Waveforms. Step Waveform. Exponential Waveform. Sinusoidal Waveform. Composite Waveforms. Waveform Partial Descriptors. Energy Storage Elements. Capacitors. Inductors. Capacitors and Inductors Combinations. Equivalent Capacitance and Inductance. Analysis of First- and Second-Order Transient Circuits. First-Order Circuits. RC and RL Circuits. First-Order Circuit Step Response. Initial and Final Conditions. First-Order Circuit Sinusoidal Response. Second-Order Circuits. Series RLC Circuit. Parallel RLC Circuit. Second-Order Circuit Step Response. Other Second-Order Circuits. AC Circuits Analysis Techniques. Sinusoids. Sinusoidal and Complex Forcing Function. Phasors. Phasor Relationship for Circuits Elements. Impedance. Admittance. Phasor Diagrams. Basic analysis Using Kirchhoffs Laws. Analysis Techniques. Power Calculations in AC Circuits. Instantaneous Power. Average Power. Maximum Average Power Transfer. RMS Values. Power Factor. AC Power. Complex Power. Power Factor Correction. Single-Phase Three-Wire Circuits. Home Power. Poly-Phase Circuits. Resonant Circuits. Analysis of Magnetically Coupled Networks. Mutual Inductance. Dot Convention. Energy Analysis. Ideal Transformer. Transformer Equivalent Circuits. Analysis of Three-Phase Circuits. Three-Phase Circuits. Three-Phase Connections. Power Relationship. Power Factor Correction. Variable-Frequency Circuits. Variable-frequency-Response Analysis. Sinusoidal Frequency Analysis. Bode Plots. Resonant Circuits. Passive Filters. Electrical Safety Considerations. Electric shock protection.

**Metody oceny:**

two assessments + final examine

**Egzamin:**

**Literatura:**

Irwin J. D., Nelms R. M.: Basic Engineering Circuit Analysis, Willey, 9th edition. Further Readings: Griffiths D.J.: Introduction to Electrodynamics, Prentice Hall, 3rd edition. Dorf R.C., Svoboda J.A.: Introduction to Electric Circuits, 7th edition. Svoboda J.A.: Worked Examples from the Electric Circuit Study Applets, Willey, 2006. Thomas R. E., Rosa A.J., Toussaint G.J.: The Analysis and Design of Linear Circuits, Willy, 2009, 6th edition.

**Witryna www przedmiotu:**

**Uwagi:**

## Efekty przedmiotowe