



Subject card

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| Subject name and code | Electric Circuits, PG_00045972 | | | | | | |
| Field of study | Electrical Engineering | | | | | | |
| Date of commencement of studies | February 2025 | | Academic year of realisation of subject | | 2024/2025 | | |
| Education level | second-cycle studies | | Subject group | | | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 1 | | Language of instruction | | Polish | | |
| Semester of study | 1 | | ECTS credits | | 2.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Jacek Horiszny | | | | |
| | Teachers | | dr hab. inż. Jacek Horiszny | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 0.0 | 30 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 30 | | 10.0 | | 10.0 | 50 |
| Subject objectives | Obtaining skills in the use of integral Laplace transformation in the theory of electrical circuits for the analysis of circuits in the transient state, as well as skills in the use of the PSPICE simulation program for the analysis of electrical circuits. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | [K7_U06] is able to analyse, model, simulate and design electrical systems | | Creates a circuit model in PSpice. Performs simulation calculations of steady and transient states with constant and sinusoidally varying energization. | | [SU4] Assessment of ability to use methods and tools | | |
| | [K7_W01] has an extended and deepened knowledge of mathematics, including selected issues of numerical methods and knowledge useful for solving tasks in the field of electrotechnology and electrodynamics, has a general knowledge of technical sciences covering their fundamentals and applications | | Determines initial conditions for a transient state. Creates an operator model of a circuit for a transient state. Describes the created model with algebraic equations and calculates the Lapalce transform of the required quantity. Calculates the inverse transform. | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | [K7_K02] is aware of the impact of engineering activities on the environment, understands the the non-technical effects of those activities | | Assesses the influence of transient processes in an electric circuit on its components. | | [SK5] Assessment of ability to solve problems that arise in practice | | |
| Subject contents | Lectures Analysis of transient states using the operator method: basics of the Laplace transform, transform of a differential equation, calculation of free and forced response for first and second order equations, inverse transform, operator impedance, Kirchhoff's laws in the operator form, initial conditions in the operator method. Characteristics of the PSpice program | | | | | | |
| Prerequisites and co-requisites | Knowledge of electrical circuits at the first degree level course. | | | | | | |

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| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | written exam | 55.0% | 70.0% |
| | tasks for the laboratory | 55.0% | 30.0% |
| Recommended reading | Basic literature | 1. Bolkowski S.: Teoria obwodów elektrycznych. WNT Warszawa 2012. 2. Osiowski J., Szbatin J.: Podstawy teorii obwodów elektrycznych. WNT warszawa 1998. 3. Papoulis A.: Obwody i układy. WKiŁ Warszawa 1988 | |
| | Supplementary literature | 1. Chua L.O., Pen-Min Lin: Komputerowa analiza układów elektronicznych. WNT Warszawa 1981. | |
| | eResources addresses | Adresy na platformie eNauczanie: OBWODY ELEKTRYCZNE [ET II][2024/25] - Moodle ID: 43428 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43428 | |
| Example issues/ example questions/ tasks being completed | 1. Calculate the transient current in a given RC, RL or RLC circuit powered by direct or sinusoidal voltage based on the solution of the differential equation using the operator method. 2. Calculate the transient current in a given RC, RL or RLC circuit powered by direct or sinusoidal voltage based on the Laplace equivalent diagram. 3. Expand the periodic current (voltage) waveform into a Fourier trigonometric series. 4. Expand the periodic current (voltage) waveform into a complex Fourier series. 5. Calculate the amplitude and phase spectrum of a continuous signal. 6. Calculate the amplitude and phase spectrum of a discrete signal. | | |
| Work placement | Not applicable | | |

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