



## Subject card

|   |  |  |  |                                     |   |            |     |
|---|--|--|--|-------------------------------------|---|------------|-----|
| Subject name and code                       | Electric Circuits III, PG_00026206   |  |  |                                     |   |            |     |
| Field of study                              | Electrical Engineering   |  |  |                                     |   |            |     |
| Date of commencement of studies             | October 2022   |  | Academic year of realisation of subject  |                                     | 2023/2024   |            |     |
| Education level                             | first-cycle studies  |  | Subject group  |                                     |   |            |     |
| Mode of study                               | Full-time studies  |  | Mode of delivery   |                                     | at the university   |            |     |
| Year of study                               | 2  |  | Language of instruction  |                                     | Polish  |            |     |
| Semester of study                           | 3  |  | ECTS credits   |                                     | 4.0   |            |     |
| Learning profile                            | general academic profile   |  | Assessment form  |                                     | exam  |            |     |
| Conducting unit                             | Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> Faculty of Electrical and Control Engineering  |  |  |                                     |   |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | dr inż. Adam Młyński   |                                     |   |            |     |
|   | Teachers   |  | dr inż. Adam Młyński   |                                     |   |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial   | Laboratory                          | Project   | Seminar    | SUM |
|   | Number of study hours  | 15.0   | 30.0   | 0.0                                 | 0.0   | 0.0        | 45  |
|   | E-learning hours included: 0.0   |  |  |                                     |   |            |     |
|   | Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17026">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=17026</a>  |  |  |                                     |   |            |     |
| 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  | 45   |  | 7.0                                 |   | 48.0       | 100 |
| Subject objectives                          | Mastering the analysis of electrical circuits with periodic non-sinusoidal source. Mastering the analysis of electrical circuits in transient states in the time and method of operators. Understanding the phenomena in electrical circuits with distributed parameters and their analysis by substitution schemas. |  |  |                                     |   |            |     |
| Learning outcomes                           | Course outcome   |  | Subject outcome  |                                     | Method of verification  |            |     |
|   | K6_W03   |  | The student solves phenomenone in electrical circuits in the frequency domain. The student solves circuit transients using differential equations and The student describes the long line, explains and analyzes the phenomenon in the line by substitute schemas. |                                     | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge |            |     |
|   | K6_U04   |  | The student analyzes phenomena in electric circuits in the frequency domain. The student explains and solves circuits in transient states using the differential equations method  |                                     | [SU1] Assessment of task fulfilment   |            |     |
|   | K6_K05   |  | The student assesses the impact of transient formation of the possibility of switching overvoltage. Risk assessment for technical devices.   |                                     | [SK5] Assessment of ability to solve problems that arise in practice  |            |     |

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| Subject contents   | Non-sinusoidal periodic signals. Fourier transform and Fourier integral. Develop signal to Fourier series. . Amplitude and phase characteristics. Effective value of signal. Powers of periodic non-sinusoidal circuits. Analysis of circuits with periodic non-sinusoidal excitations. Frequency analysis of circuits. Description of electrical circuits transients in the time domain and in the field operators. Solving circuits I and II orders of equation in transients at constant, sinusoidal and complex excitations. Replacement schemes of electrical circuits. Solutions d'Alambert long line equations. Incident and reflected waves. Conditions at the end of a long line. Analysis of developments in the long line method substitute schemas.   |   |                               |
| Prerequisites and co-requisites                                | Knowledge of the subject Foundations of Mathematics (04 11 10 01 07) Knowledge of the subject Mathematics (04 11 10 02 08) Knowledge of the subject Electrical circuits (04 11 10 01 16)  |   |                               |
| Assessment methods and criteria                                | Subject passing criteria  | Passing threshold   | Percentage of the final grade |
|  | Written exam  | 60.0%   | 55.0%                         |
|  | Midterm colloquium  | 60.0%   | 45.0%                         |
| Recommended reading  | Basic literature  | 1. Bolkowski S.: Teoria obwodów elektrycznych. WNT, Warszawa 2009<br>2. Bolkowski S. i in. : Zbiór zadań z elektrotechniki teoretycznej. WNT, Warszawa 2009<br>3.Krakowski M.: Elektrotechnika teoretyczna, tom. 1. PWN, Warszawa 1999<br>4. Cichocki A. i in. : Zbiór zadań z elektrotechniki teoretycznej. PWN, Warszawa 1985<br>5. Horiszny J. i in. : Obwody elektryczne w stanie ustalonym. Zbiór zadań. Wydawnictwo PG. Gdańsk 2005 |                               |
|  | Supplementary literature  | 1. Kurdziel R.: Podstawy elektrotechniki. WNT, Warszawa 1973.<br>2. Mikołajuk K., Trzaska Z.: Elektrotechnika teoretyczna - analiza i synteza elektrycznych obwodów liniowych. PWN,Warszawa 1987  |                               |
|  | eResources addresses  | Adresy na platformie eNauczanie:<br>OBWODY ELEKTRYCZNE III [2023/24] - Moodle ID: 32117<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32117">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32117</a>  |                               |
| Example issues/<br>example questions/<br>tasks being completed | 1.Take the formulas determining the mean value and the effective signal expressed by a Fourier series. 2.Solve the given circuit, the force is expressed in the form of a Fourier series. Calculate the mean value and the effective value of the specified voltage or current signals. 3.For the RL series circuit being connected to a source of alternating sinusoidal SEM to determine the conditions the transition state in solution does not occur component. That the maximum value of the so-called "inrush current" may occur in this case? 4.For a given "first order" circuit write the differential equation and determine the initial conditions. 5.Determine the specified parameter in the given circuit "second order" (R, L or C) to be able to transition occurred in the oscillations.6.What should be the condition that the wave reaches the end of a long line, there was no reflected wave? Give reasons. |   |                               |
| Work placement   | Not applicable  |   |                               |