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| COURSE DESCRIPTION CARD |
| **Faculty of Electrical Engineering** |
| Field of study | Electrical and Electronics Engineering | Degree level and programme type | bachelor’s degree  |
| Specialization/ diploma path |  | Study profile |  |
| Course Name | Electrical Circuits 1 | Course code | IS-FEE-10070W |
| Course type | elective |
| Forms and number of hours of tuition | L | C | LC | P | SW | FW | S | Semester | winter |
| 15 | 30 | 15 |  | 15 |  |  | No. of ECTS credits | 7 |
| Entry requirements |  |
| Course objectives | To receive the abilities to perform a simple analysis of linear DC and AC circuits contain up to two sources. To use complex numbers to calculate currents, voltages and power. Received results have to be properly interpreted and verified. Student discuss problems by using good terminology. |
| Course content | Element Constrains. Current and equivalent voltage on basic elements. Basic circuit analysis. Node-Voltage and Loop-Current Analysis. Thevenin equivalent circuits. Power of load and source. Analysis of resistive circuits with OA. Sinusoids and phasors. Phasor diagrams for simple circuits. Circuits analysis with phasors. Energy and power. Compensation of reactive power. The frequency analysis of RL, RC and RLC circuits. Simulation software for choosen applications. Interpretation of results. |
| Teaching methods | problem based learning, self-work, discussions, experiments |
| Assesment methods | Problems are presented for students at the beginning of semester. The evaluation is performing during personal discussion on several problems concerning all indicated topics.  |
| Symbol of learning outcome | Learning outcomes | Reference to the learning outcomes for the field of study |
| LO1 | uses the proper concepts from the electrical circuits domain |  |
| LO2 | describes the electrical features, dependences and parameters of basic elements of electric circuits |  |
| LO3 | defines and describes the dependences in resonant circuits |  |
| LO4 | calculates the currents, voltages and powers in DC and AC circuits also with the use of complex numbers |  |
| LO5 | applies the simulations to analyse of DC and AC circuits |  |
| Symbol of learning outcome | Methods of assessing the learning outcomes | Type of tuition during which the outcome is assessed |
| LO1 | evaluating the student’s solutions of presented problems | L, C, LC |
| LO2 | evaluating the student’s solutions of presented problems | L, C |
| LO3 | evaluating the student’s solutions of presented problems, personal assessment | L, LC |
| LO4 | evaluating the student’s solutions of presented problems, personal assessment | C, L, SW |
| LO5 | evaluating the student’s solutions of presented problems, personal assessment | C, LC, SW |
| Student workload (in hours) | No. of hours |
| Calculation | lecture attendance | 15 |
| attending the class sessions | 30 |
| attending and providing the laboratory class experiments and simulation at workshop | 30 |
| self and team -working on learning and preparing the problems solutions | 60 |
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| preparation for and participation in exams/tests | 25 |
| participation in student-teacher sessions related to the classes and lecture | 15 |
| TOTAL: | 175 |
| Quantitative indicators | HOURS | No. of ECTS credits |
| Student workload – activities that require direct teacher participation | 90 | 3 |
| Student workload - practical activities | 160 | 6 |
| Basic references | 1. Thomas R. E., Rosa A. J., Toussaint G. J.: The Analysis & Design of Linear Circuits. 6th ed, John Wiley & Sons Inc. 2009.
2. Tung L. J., Kwan B. W.: Circuit Analysis. World Scientific 2001.
3. Irvin J. D., Nelms R. M.: Basic Engineering Circuits Analysis. International Student Version. John Willey & Sons Inc. 2008.
4. https://www.electrical4u.com/electrical-engineering-articles/circuit-theory/
5. https://www.khanacademy.org/science/electrical-engineering
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| Supplementary references |  |
| Organisational unit conducting the course | Department of Electrotechnics, Power Electronics and Power Engineering | Date of issuing the programme |
| Author of the programme | Jaroslaw Makal, Ph.D. Eng. | 03.02.2023 |