

## DESCRIPTION OF THE COURSES

- Course code: ELR2103
- Course title: INFORMATICS – DIGITAL MODELLING
- Language of the lecturer: polish

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	1			1	
<i>Number of hours/semester*</i>	15			15	
<i>Form of the course completion</i>	pass			pass	
<i>ECTS credits</i>	1			1	
<i>Total Student's Workload</i>	30			30	

- Level of the course: basic
- Prerequisites:  
completed course: Fundamentals of Circuit Theory, Numerical Methods.
- Name, first name and degree of the lecturer/supervisor:  
Eugeniusz Rosołowski, Prof., Ph. D., D. Sc.
- Names, first names and degrees of the team's members:  
Jan Iżykowski, Ph. D., D. Sc.  
Waldemar Rebizant, Ph. D., D. Sc.  
Marek Michalik, Ph. D.  
Mirosław Łukowicz, Ph. D.  
Witold Dzierżanowski, Ph. D.
- Year: 3      Semester: 5
- Type of the course (obligatory/optional): obligatory
- Aims of the course (effects of the course):  
The course provides descriptions of digital models used for solution of electromagnetic transients in electric circuits.
- Form of the teaching (traditional/e-learning): traditional
- Course description:  
Introduction to digital modelling of electrical circuits and networks with the approaches of computer science elements. Issues of digital modelling and computer simulations of electromagnetic transient phenomena in electrical grids. Mathematical and numerical models of single-phase and three-phase elements. Characteristic of EMTP program together with the graphical editor ATPDRAW. Description of the program structure, running of the program and preparation of simulation models for selected networks. Principles of simulation and analysis of results.
- Lecture:

	<i>Particular lectures contents</i>	<i>Number of hours</i>
1.	Introduction to EMTP program. Structure of the program and its overall characteristic. Principles of preparing the input data file:	2

	graphical editor ATPDraw. Structure of the input data file. Auxiliary programs.	
2.	Digital models of linear RLC elements with lumped parameters.	2
3.	Digital models of RLC branch with different structure.	2
4.	Synthesis and numerical solution of complex network model for transient simulation.	2
5.	Digital model of a single line with distributed parameters. Principles of preparing multi-phase models.	2
6.	State equations model of a network: synthesis and numerical solution.	2
7.	Errors and limitations of using the computer tools to simulation of electromagnetic transients.	2
8.	Pass test.	1

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents:
  1. Introduction to EMTP/ATP; program installation; input data editing in ATPDraw. Input data structure.
  2. Simple EMTP network model: editing with using of ATPDraw, running, analysis of the results.
  3. Transient simulation in non-linear circuit: data format, determination of initial conditions, analysis of the results.
  4. Short-circuit transients simulation in three-phase transmission line with two-end sources.
  5. Transients simulation with three-phase transformers: short-circuit and the transformer energizing.
  6. Transients simulation with three-phase network: different source model and the three-phase lines.
- Basic literature:
  - [1] Kacejko P., Machowski J., Zwarcia w systemach elektroenergetycznych, WNT Warszawa 2002.
  - [2] Bernas S., Ciok Z.: Modele matematyczne elementów systemu elektroenergetycznego. WNT, Warszawa, 1997.
  - [3] <http://www.rose.pwr.wroc.pl/>
- Additional literature:
  - [1] Dommel H.W.: Electromagnetic Transients Program. Reference Manual. BPA, Portland, 1986.
  - [2] Alternative Transients Program. Rule Book. K.U. Leuven, EMTP Center, 1987.
  - [3] Ogrodzki J.: Komputerowa analiza układów elektronicznych. PWN, Warszawa, 1994
- Conditions of the course acceptance/creditation:
  - test pass, project pass.

\* - depending on a system of studies