



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematical modeling of energy installations

### Course

Field of study

Power Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

II/3

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

dr inż. Arkadiusz Dobrzycki

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical  
Engineering

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### Prerequisites

Knowledge of the basics of electrical engineering, electrical power engineering, the ability to use a spreadsheet, as well as readiness to cooperate within a team.

### Course objective

Understanding the principles of construction, modeling, calculation, design and operation of power installations and networks also in emergency conditions; acquiring the skill of writing computer programs for the purpose of modeling elements of power installations and networks also in transient states.



### Course-related learning outcomes

#### Knowledge

1. has knowledge about modeling the components of the power system using ready-made models and developing own models,
2. has knowledge about the use of object-oriented programming in modeling the state of work of energy elements and installations,
3. has knowledge of the effects of mechanical and thermal flows of short-circuit currents,
4. has knowledge of the principles of safe performance of work on power equipment.

#### Skills

1. has the ability to implement a computer mathematical model of energy installation elements,
2. has the ability to develop a computer program to analyze the work of power components and installations also in transient states.

#### Social competences

1. is aware of the responsibility of the power engineering engineer, in particular the impact of his activities on safety, related to the occurrence of emergency states in the power system.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: assessment of knowledge and skills demonstrated on the written exam of a descriptive / problem nature (checking the ability to use the acquired knowledge); individual elements assessed according to the points system, 50% of the maximum number of points required to pass.

Laboratory classes: development of a computer program simulating short circuits in power installations, development of the application with additional functionalities, presentation of programming techniques used.

### Programme content

Lecture: Analysis of the operating states of components and installations in transient states, assessment of mechanical and thermal effects of short-circuit currents in rigid and flexible wiring, rules for the safe performance of work on power equipment.

Laboratory classes: object oriented programming in VS in the C # language (property fields, constructors, inheritance, creation of own controls and charts).

### Teaching methods

Lecture: multimedia presentation (including drawings, photos, animations, sound, movies) supplemented with examples given on the board, lecture conducted in an interactive way with the formulation of questions for a group of students or specific students indicated, during the lecture initiating discussions, taking into account various aspects issues presented, including: economic,



ecological, legal, social, etc., presenting a new topic preceded by a reminder of related content known to students in other subjects;

Laboratory classes: demonstrations, independent programming (computational) tasks.

### Bibliography

#### Basic

1. Musiał E. "Instalacje i urządzenia elektroenergetyczne", WSiP, Warszawa 1998.
2. Markiewicz H. "Instalacje elektryczne", WNT, Warszawa, 2012.
3. Lejdy B. "Instalacje elektryczne w obiektach budowlanych", WNT, Warszawa 2003.
4. Marzecki J. "Miejskie sieci elektroenergetyczne", Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1996.
5. Strojny J., Strzałka J. "Zbiór zadań z sieci elektrycznych", Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH, Kraków 2000.
6. Handke A., Mitkowski E., Stiler J "Sieci elektroenergetyczne", Wydawnictwo Politechniki Poznańskiej, Poznań 1978.

#### Additional

1. Normy i rozporządzenia związane z sieciami i instalacjami elektrycznymi.
2. Internet - wyselekcjonowana literatura tematu.
3. Dobrzycki A., Filipiak M., Komputerowo wspomaganą analizą pracy układów czwórnikowych, Academic Journals Poznan University of Technology, nr 89, 2017, 155-162.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	39	1,0
Classes requiring direct contact with the teacher	22	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	17	0,0

<sup>1</sup> delete or add other activities as appropriate