

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Modelowanie systemów OZE**
 Name in English: **Modeling of RES systems**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Renewable Energy Sources**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **optional**
 Subject code: **ELR051320**
 Group of courses: **NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|--|----------------------|---------|------------|---------|---------|
| Number of hours of organized classes in University (ZZU): | 30 | | | | |
| Number of hours of total student workload (CNPS): | 60 | | | | |
| Form of crediting: | crediting with grade | | | | |
| For group of courses mark (X) final course: | | | | | |
| Number of ECTS points: | 2 | | | | |
| including number of ECTS points for practical (P) classes : | | | | | |
| including number of ECTS points for direct teacher-student contact (BK) classes: | 1.40 | | | | |

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. The basic knowledge of electrical circuit theory and programming in Matlab.

SUBJECT OBJECTIVES

- C1. Acquaint students with the methods of computer modeling of renewable energy systems.
 C2. Increasing knowledge of the understanding and application of computer simulation RES systems.

SUBJECT LEARNING OUTCOMES*relating to knowledge:*

- PEU_W01 Has an extended knowledge of the simulation in Matlab of elements of electrical circuits.
 PEU_W02 He knows the methods of modeling RES systems.

*relating to skills:**relating to social competences:*

- PEU_K01 Is able to think act and in a creative manner.

| PROGRAMME CONTENT | | |
|---------------------------|---|------------------|
| Form of classes - lecture | | Number of hours: |
| Lec 1 | Introduction. Basic elements of Matlab language. | 2 |
| Lec 2 | Advanced elements of Matlab language. | 2 |
| Lec 3 | Electrical Power system simulation library Power System Blockset. | 2 |
| Lec 4 | Modeling of electrical power system elements - selected topics. | 2 |
| Lec 5 | Computer models of renewable energy sources. | 2 |
| Lec 6 | Solving differential equations in the program Matlab. | 2 |
| Lec 7 | Simulation of electrical circuits in steady states. | 2 |
| Lec 8 | Simulation of electrical circuits in transient. | 2 |
| Lec 9 | Power line model with distributed parameters | 2 |
| Lec 10 | Simulation of faults of power line. | 2 |
| Lec 11 | Design of power system with renewable energy sources. | 2 |
| Lec 12 | Simulation of the power system with renewable energy sources. | 2 |
| Lec 13 | Influence of the parameters the model on the results of the analysis. | 2 |
| Lec 14 | Summary of lecture topics. Conclusions and comments. | 2 |
| Lec 15 | Final test. | 2 |
| Total hours: | | 30 |

| TEACHING TOOLS USED |
|--------------------------------------|
| N1. Lectures using multimedia tools. |

| EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT | | |
|---|-------------------------------|--|
| Evaluation <i>F - forming (during semester) P - concluding (at semester end)</i> | Educational effect number | Way of evaluating educational effect achievement |
| F1(w) | PEU_W01 PEU_W02 PEU_K01 | Written test. |
| P(w) | P=F1 | |

| PRIMARY AND SECONDARY LITERATURE |
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| PRIMARY LITERATURE: [1] Mathworks, „Power System Blockset- User Guide” 2000 [2] Z. Lubośny, „”Elektrownie wiatrowe w systemie elektroenergetycznym” 2007 SECONDARY LITERATURE: [1] A. V. Oppenheim, R. W. Schaffer „Cyfrowe przetwarzanie sygnałów” 1989 [2] A. Papoulis „Obwody i układy” 1988 |

| SUBJECT SUPERVISOR |
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