# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | Code |
|---|---|
| **Computer aided calculations and decision making in power** | **1010312411010315649** |

| Field of study | Profile of study (general academic, practical) | Year /Semester |
|---|---|---|
| **Power Engineering** | **(brak)** | **1 / 1** |
| **Elective path/specialty** | **Subject offered in:** | **Course (compulsory, elective)** |
| **-** | **Polish** | **obligatory** |

| Cycle of study: | Form of study (full-time,part-time) |
|---|---|
| **Second-cycle studies** | **full-time** |

| No. of hours | No. of credits |
|---|---|
| Lecture: **15** Classes: **-** Laboratory: **45** Project/seminars: **-** | **4** |

| Status of the course in the study program (Basic, major, other) | (university-wide, from another field) |
|---|---|
| **(brak)** | **(brak)** |

| Education areas and fields of science and art | ECTS distribution (number and %) |
|---|---|
| **technical sciences** | **4 100%** |

## Responsible for subject / lecturer:

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## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | Basic knowledge in field of electrical engineering, power engeneering and computer operations. |
| 2 | **Skills** | Effective self-education in study field. Skills in basic operations in computer systems. |
| 3 | **Social competencies** | Student should have consciousness of necessity of improving his competences in innovation technologies for electrical engeneering. |

## Assumptions and objectives of the course:

Studies of computer methods in power system, power plants and network designing. Computer technology in power system control. Computer decision support systems in power stations, power plants and networks. Mathematic models for power instalations and other elements. Simle optimization problems solutions.

## Study outcomes and reference to the educational results for a field of study

### Knowledge:

1. Knowledge in methodology and principles of modern, automated designing for power engeneering objects and power plants. - [K_W04+++, K_W15++, K_W18++]

2. Knowledge in decision support and design systems in power plants and power system. - [K_W04+++, K_W13+++]

3. Knowledge in basis of computer modelling for substations, electrical networks and distributed generation. - [K_W04+++, K_W08++]

### Skills:

1. Use knowledge of supply structure desingning for electrical power objects, exploitation configuration for normal and failure states and final documentation in european standard. - [K_U04++, K_U06+++, K_U08+++]

2. Ability to implementation expert and design tools for determination of secure exploitation parameters for network and systems cooperated with power and distributed generation. - [K_U04++, K_U13++]

3. Use knowledge of the simple optimization solutions in field of electrical power engineering. - [K_U06+++, K_U09++]

### Social competencies:

1. One has an awareness of usage of modern methods for designing and high-class solutions. - [K_K02+++]

2. One has an awareness of economic and social acceptance for the choosen technical solution. - [ K_K01+++ ]

## Assessment methods of study outcomes

- assessment of knowledge on final exam,
- assessment of knowledge and skills on the basis of test consisting on solving of design problems in laboratory.
- permanent assessment on lectures and laboratories.

## Course description

Lecture: Power flow, voltage levels and power losses calculations. Short-circuit calculations in power networks. Substation and distribution network designing supported by Siemens Simaris Design system. Power unit as control object. Power unit control systems. Thermal power station work simulation.

Update 2017: High power hybrid power plants, wind turbines and photovoltaic In distribution networks

Laboratory: Practical studies linked with lecture.

Desing classes: Desing problems and solutions linked with lecture and laboratory content.

Applied training methods

Lecture: the theory of the closely related to practice, Multimedia lecture

Laboratory: Case study of the real MV distribution network, Computational experiments, working in a team

## Basic bibliography:

1. Kacejko P.: Generacja rozproszona w systemie elektroenergetycznym. Wydawnictwo Politechniki Lubelskiej, Lublin, 2004 r.
2. Kujszczyk Sz.: Nowoczesne metody obliczeń elektroenergetycznych sieci rozdzielczych. WNT, Warszawa, 1984 r.
3. Pawlik M. Układy i urządzenia potrzeb własnych elektrowni. WNT. 1986 r.
4. Lorenc J. Admitancyjne zabezpieczenia ziemnozwarciowe. Wyd. PP. 2007 r.
5. Zajczyk R.: Zwarcia w układach elektroenergetycznych, Gdańsk, 2005 r.
6. Lubośny Z.: Farmy wiatrowe w systemie elektroenergetycznym, WNT, Warszawa, 2009 r.

## Additional bibliography:

1. Planning of Power Distribution - the manual for Totally Integrated Power, Siemens AG, Erlangen, 2001.
2. Marszałkiewicz K., Grządzielski I., Trzeciak A.: Ocena wielokryterialna możliwości przyłączenia jednostek wytwórczych do sieci elektroenergetycznej średniego napięcia. Wiadomości Elektrotechniczne, Warszawa, 2012, 1 - ISSN 0043-5112 ss. 3-8..
3. Beynon-Davis Paul: Systemy baz danych. WNT, Warszawa, 2004 r.
4. Marszałkiewicz K., Grządzielski I., Trzeciak A.: Impact of Voltage Conditions on Distributed Generation Connctiivity in Medium Voltage Grids. Acta Energetica, 4/25 2015 ISSN 2300-3022
5. S. Khokhar ; A. A. Mohd Zin ; A. S. Mokhtar ; Nam Ismail: MATLAB/Simulink based modeling and simulation of power quality disturbances --- Energy Conversion (CENCON), 2014 IEEE Conference on, 01 December 2014

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Participation in lectures | 15 |
| 2. Participation in laboratory classes | 45 |
| 3. Consultations | 5 |
| 4. Preparaton to laboratory classes and report realisation | 25 |
| 5. Preparation to final exam | 6 |
| 6. Final exam | 2 |

## Student's workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 98 | 4 |
| Contact hours | 50 | 3 |
| Practical activities | 75 | 3 |