



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electronics and power electronics [S1Eltech1>EiE3]

### Course

Field of study

Electrical Engineering

Year/Semester

3/5

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

0

Laboratory classes

30

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr inż. Michał Krystkowiak

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### Lecturers

### Prerequisites

Knowledge in the field of mathematics, physics and circuit theory at the level of the first year of study. Ability to understand and interpret the transmitted messages and effective self-education in the field related to the chosen field of study.

### Course objective

Practical knowledge of propriety and basic characteristics of power electronics converters, rectifiers, AC/AC converters, AC/DC converters and inverters.

### Course-related learning outcomes

Knowledge:

1. Knows and understands the basic laws of electrical engineering, properties of elements of electrical circuits, has detailed knowledge of the theory of electrical circuits (for steady and transient states), knows and understands the theory of long line.
2. Has structured knowledge in the field of metrology and the properties and operation of modern measuring equipment.
3. Knows the structure and operation of electronic, optoelectronic and simple analog and digital

electronic and power electronic devices, understands the processes occurring in their life cycle.

Skills:

1. Is able to plan and carry out simulation and measurements of basic quantities characteristic of electrical systems; can present the results obtained in numerical and graphic form, interpret them and draw the right conclusions.
2. Is able to make a critical analysis and assessment of the functioning of existing electrical systems and devices, using appropriate methods and tools.

Social competences:

Understands the importance of knowledge in solving problems and raising professional, personal and social competences; is aware that in technology knowledge and skills quickly become obsolete.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Assessment of knowledge and skills demonstrated during the written test-problem exam - based on the number of points obtained, evaluation of the exercise reports.

### Programme content

Learning the properties and basic characteristics of power electronic semiconductor elements. Getting to know the structure and principles of operation of selected power electronic converters. Issues of impact on the power supply network.

### Course topics

Investigation of basic power electronic converters: 1-phase and 3-phase controlled rectifiers, alternating voltage regulators controlled symmetrically and unbalanced, pulse DC-DC regulators: thyristor and transistor. Investigation of 1- and 3-phase voltage inverters with PWM modulation. Simple active compensation systems.

### Teaching methods

Laboratory

1. Continuous assessment, rewarding the increase in the ability to use known principles and methods.
2. Assessment of knowledge and skills related to the exercise, evaluation of the exercise report.

### Bibliography

Basic

1. Barlik R., Nowak M., Technika tyrystorowa, Wydawnictwa Naukowo-Techniczne, Warszawa 1997.
2. Frąckowiak L., Januszewski S., Energoelektronika. Cz. 1, Półprzewodnikowe przyrządy i moduły energoelektroniczne, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.
3. Mikołajuk K., Podstawy analizy obwodów energoelektronicznych, Państwowe Wydawnictwo Naukowe, Warszawa 1998.
4. Mohan N., Undeland N., Robins W., Power Electronics, Jon Wiley & Sons Inc., New York 1999.
5. Tunia H., Smirnow A., Nowak M., Barlik R., Układy energoelektroniczne. Obliczanie, modelowanie, projektowanie, Wydawnictwa Naukowo-Techniczne, Warszawa 1982.

Additional

1. Frąckowiak L., Energoelektronika. Cz. 2, Wydawnictwo Politechniki Poznańskiej, Poznań 2000.
2. Kaźmierkowski M., Krishnan R., Blaabjerg H., Control in Power Electronics, Academic Press, Amsterdam 2002.
3. Piróg S., Energoelektronika, Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH, Kraków 1998.
4. Strzelecki R., Supronowicz H., Współczynnik mocy w systemach zasilania prądu przemiennego i metody jego poprawy, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	35	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00