STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Computer-aided design of power devices**		Code
Field of study **Mathematics in Technology**	Profile of study (general academic, practical) **general academic**	Year /Semester **4 / 7**
Elective path/specialty **Device diagnostics**	Subject offered in: **Polish**	Course (compulsory, elective) **compulsory**
Cycle of study: **First-cycle studiem** **(Polish Qualifications Framework level six)**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **-** Classes: **-** Laboratory: **-** Project/seminars: **30**		No. of credits **4**
Status of the course in the study program (Basic, major, other) **major**	(university-wide, from another field) **university-wide**	
Education areas and fields of science and art **Technical sciences** **Technical sciences**		ECTS distribution (number and %) **4 100%** **4 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	He/She has ordered and theoretically founded knowledge in computer science, including numerical methods; he/she knows at least one software package or programming language [K_W06 (P6S_WG)].
2	**Skills**	He/She can work individually and in a team; he/she knows how to estimate the time needed to complete the task ordered; he/she is able to develop and implement a schedule of works to ensure that the deadline is met [K_U14 (P6S_UO)].
3	**Social competencies**	He/She is able to think and act in a creative and entrepreneurial way, taking into account safety, work ergonomics and economic aspects; he she is aware of the need to initiate actions for the public interest and responsibility for the results of the team and individual participants [K_K03 (P6S_KO)].

Assumptions and objectives of the course:

Familiarization with selected numerical methods supporting the process of modeling physical phenomena and designing electrical power devices.

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

Knowledge:

1. He/She has structured and theoretically founded knowledge in the field of technical sciences, including electrical engineering, electronics and automation [K_W04 (P6S_WG)].
2. He/She has structured and theoretically founded knowledge related to the design, construction, operation principle and operation of devices, machines, systems, etc .; he/she knows and understands the processes occurring in their life cycle [K_W08 (P6S_WG)].

Skills:

1. He/She can construct an algorithm for solving a simple engineering task and implement and test it in a chosen programming environment [K_U4 (P6S_UW)].
2. He/She can formulate an engineering problem, conduct detailed research using analytical or simulation or experimental methods, interpret the obtained results and draw conclusions [K_U5 (P6S_UW)].
3. He/She is able to prepare documentation or to prepare a speech with a multimedia presentation related to the implementation of an engineering task using specialized terminology [K_U12 (P6S_UK)].
4. He/She is able to use a foreign language sufficiently to communicate, and reading comprehension of mathematical texts, technical documentation and similar documents [K_U13 (P6S_UK)].

Social competencies:

1. He/She is aware of the level of his knowledge in relation to the conducted research in sciences and technical sciences [K_K01 (P6S_KK)].
2. He/She has the awareness of deepening knowledge to solve newly created technical problems [K_K02 (P6S_KK)].

Assessment methods of study outcomes

The rating is based on the completed project.

Course description

Introduction to handle of artificial neural networks (ANN) simulator. Exercises with training data input to SSN and a description of the data. Creation and training the ANN simple math equation using the default values of the program. Study of the influence the changing simulator ANN parameters on results of its learning. Presentation of ANN work. Learning the neural network to recognize states of logic gates. The use of ANN for modeling curves describing the results of measurements. The use of ANN modeling of social phenomenon. Designing SSN to identify defects in the chosen insulation system.

Update: 2018

Basic bibliography:

1. Korbicz J., Obuchowicz A., Uciński D., Sztuczne sieci neuronowe: podstawy i zastosowania, Akademicka Oficyna Wydawnicza PLJ, Warszawa, 1994.
2. Rybarczyk A., Sztuczne sieci neuronowe: laboratorium, Wydawnictwo Politechniki Poznańskiej, Poznań, 2008.
3. Żurada J., Barski M., Jędruch W., Sztuczne sieci neuronowe: podstawy teorii i zastosowania, Wydawnictwo Naukowe PWN, 1996.

Additional bibliography:

1. Bernat J., Gielniak J., Morańda H., Program komputerowy wykorzystujący sztuczne sieci neuronowe do interpretacji wyników badań przy użyciu metody RVM w celu oceny zawilgocenia izolacji papierowej transformatorów, Przegląd Elektrotechniczny, T. 84, Nr 10/2008, s. 5-7
2. Bartecki K., Sztuczne sieci neuronowe w zastosowaniach: zbiór ćwiczeń laboratoryjnych z wykorzystaniem przybornika Neural Network programu Matlab, Skrypt Politechniki Opolskiej nr 289, Oficyna Wydawnicza Politechniki Opolskiej, 2010.

Result of average student's workload

Activity	Time (working hours)
1. Preparation for the project exercises	15
2. Participation in the project exercises	30
3. Participation in the consultations related to the project	15
4. Launching and verification of the program/programs (time outside the classroom project)	20
5. Elaboration project results and prepare a report	20

Student's workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	45	2
Practical activities	85	3