STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
ECAD Application		**1010821161010833607**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electronics and Telecommunications	**general academic**	**3 / 6**

Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Computer Networks and Internet	**Polish**	**elective**

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

No. of hours					No. of credits
Lecture: **1**	Classes: **-**	Laboratory: **2**	Project/seminars: **-**		**3**

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

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**
Technical sciences	**3 100%**

Responsible for subject / lecturer:

dr inż. Sławomir Michalak
email: michalak@et.put.poznan.pl
tel. +48 616653824
Faculty of Electronics and Telecommunications
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Has a basic knowledge of the fundamentals of circuit theory, together with necessary mathematical background; this knowledge allows him/her to understand, analyze and evaluate the operation of electrical circuits. Has a basic knowledge about basic electronic elements and theirs characteristics. Have very basic knowledge about measurements and metrology.
2	**Skills**	Is able to extract information from Polish or English language literature, databases and other sources. Is able to use known mathematical analysis, algebra and theory to solve basic problems in electronics.
3	**Social competencies**	Is aware of the limitations of his knowledge and skills; is committed to further self-study. Is active in solving technical electronics problems. Is able to consulting in group.

Assumptions and objectives of the course:

Electronic Computer Aided Design (ECAD, use of computer systems to assist in the creation, modification, analysis, or optimization of a electronic design. Use of SPICE for creation and simulation own projects. Models of passive and active electronic devices. Analog and digital simulations. DC, ac, Trans simulationc. Advanced simulations FTT, noise, parametric, Worst Case and Monte Carlo.

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

Knowledge:

1. Has a wide, systematic knowledge of the properties and characteristics of electronic components, as well as of construction, analysis and design of electronic circuits. - [K1_W08]

2. Knows the theoretical foundations and principles of design of digital circuits, and of construction of digital electronic elements; knows the theoretical foundations of analysis and design of digital circuits and CAD. - [K1_W12]

Skills:

1. Is able to analyze, design and build digital circuits , using appropriate methods and engineering tools, and taking into consideration predefined criteria. Is able to use models, catalogue cards and application notes of semiconductor electronic elements. Is able to analyze and design circuits and systems using CAD. - [K1_U18]

2. Is able to extract information from Polish or English language literature, databases and other sources. Is able to synthesize gathered information, draw conclusions, and justify opinions. - [K1_U01]

3. Is able to communicate in English or in Polish in the professional environment and other environments. - [K1_U02]

4. Is capable of studying autonomously. - [K1_U05]

Social competencies:

1. Demonstrates responsibility for designed electronic and telecommunication systems. Is aware of the hazards they pose for individuals and communities if they are improperly designed or produced. - [K1_K03]
2. Is aware of the limitations of his/her current knowledge and skills; is committed to further self-study. - [K1_K01]

Assessment methods of study outcomes
1. Projects
2. Reports from laboratory execercises
3. Activity durning labs

Course description
- ECADs programs: SPICE, LTSpice, Multisim, Proteus
- Models of basic electronic passive devices (resistor, capacitor, inductor) used in CAD programms.
- Models of active elements (Ebers-Moll, Gummel-Poon).
- Models i macromodels OpAmp.
- Models of voltage and current sources (DC, AC, SIN, PULSE, EXP)
- Models of devices used in SPICE and APLAC.
- Creating models for PCB.
- Creating PCB projests.

Basic bibliography:

1. Dobrowolski A., Pod maską Spice'a. Metody i algorytmy analizy układów elektronicznych, BTC, 2004.
2. Król A., Moczko J., PSpice: Symulacja i optymalizacja układów elektronicznych, Nakom, Poznań, 1998.
3. Michalak S., Symulacja układów elektronicznych w środowisku APLAC, Wydawnictwo PP, Poznań, 2005.
4. Walczak J., Pasko M., Komputerowa analiza obwodów elektrycznych z wykorzystaniem programu SPICE: zagadnienia podstawowe, Wydawnictwo Politechniki Śląskiej, Gliwice, 2002.

Additional bibliography:

1. Porębski J. Korohoda P., SPICE program analizy nieliniowych układów elektronicznych, WNT, Warszawa, 1996.
2. Sidor T., Komputerowa analiza elektronicznych układów pomiarowych, Kraków, Wydawnictwo AGH, 2006.

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Laboratory	30
3. Reports	30
4. Project	20

Student's workload

Source of workload	hours	ECTS
Total workload	85	3
Contact hours	50	2
Practical activities	52	2