STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Electronics and Power Electronics		**1010325211010323752**
Field of study	Profile of study (general academic, practical)	Year /Semester
Electrilcal 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	**part-time**	
No. of hours		No. of credits
Lecture: **20** Classes: **-** Laboratory: **10** 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%**
Technical sciences		**4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of electrical engineering, electronics and power electronic at the basic level of education majoring in electrical engineering polytechnic
2	**Skills**	Measurements, analysis, simulation, and design simple circuits and electrical systems, electrical, electronics and power electronic
3	**Social competencies**	Is aware of the need to broaden their skills and qualifications

Assumptions and objectives of the course:

Knowledge of methods of analysis and design of electronic circuits for selected examples, linear and non-linear applications of operational amplifiers and digital circuits. Knowledge of methods of analysis and design of power electronic converters of energy, especially in the fully controllable and controlled methods of PWM pulse width modulation. Acquire skills of modeling and simulation using PSpice simulator, useful for the analysis and design of selected electronics and power electronic converters.

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

Knowledge:

1. The student knows the construction, operation, properties and design methods of selected electronic circuits, among others. linear and non-linear applications of operational amplifier, A / D and D / A converters, and analog active filters. - [K_W12+]

2. He/She knows the structure, operation, features and characteristics of the selected power converters, in particular a fully controllable and controlled by means of pulse width modulation PWM - converters - [K_W12++]

3. He/She has knowledge of the modeling and simulation of pre-designed, selected electronic circuits and power converters. - [K_W12+++K_W18++]

Skills:

1. Student can determine the output data and make appropriate selection criteria for the design of electronic circuits: analog and digital and of power converters - [-]

2. He/she is able to develop a simulation model and make the identification of model parameters for indicated the electronic circuit or a power converter. - [-]

3. He/She can do an analysis of basic electronic circuits or of power converters using the method of simulation. - [-]

Social competencies:

1. It has competence to lead a team and make the right decisions in the design and operation of electronic systems and power converters. - [-]

Assessment methods of study outcomes

Lecture:

-assessment of knowledge and skills listed on the written-test examination of a problematic,

Laboratory:

-continuous evaluation for each course,

-assessment of knowledge and skills related to the implementation of the tasks your practice,

-assessment report performed exercise.

Bonus points:

-for the activity in the classroom,

-effectiveness of the application of knowledge to solve the given problem,

-ability to work in a team.

Course description

Lecture

Introduction to integrated circuits. Structure, properties and functions of the current sources and voltage sources in integrated circuits. Selected applications of operational amplifiers. Active filters - design principles. Window comparator, sample and hold circuit, analog-to-digital a/c and digital-to-analog c/a Methods countdown. Fully controllable AC-to-DC converters with forced commutation with improved power factor. Pulse Converters DC-to-DC - theoretical analysis, properties, characteristics and applications. Voltage inverters controlled by pulse width modulation method PWM. Basic knowledge of modeling with PSpice simulator.

Laboratory

Design and simulation of active filters and converters a/c and c/a, using PSpice. Simulation studies of converters: AC-to-DC, DC-to-DC and DC-to-AC using different control methods.

Basic bibliography:

1. Kulka Z., Nadachowski M.: Wzmacniacze operacyjne i ich zastosowania. WNT, 1982.
2. Tietze U., Schenk Ch.: Układy półprzewodnikowe. WNT, 1996, 2009.
3. Kaźmierkowski M., Matysik J.: Wprowadzenie do elektroniki i energoelektroniki. PW, 2005.
4. Nowacki Z.: Modulacja szerokości impulsów w napędach przekształtnikowych prądu przemiennego. PWN, 1991.
5. Tunia H., Barlik R.: Teoria przekształtników. PW, 2003.
6. Piłaciński J.: Materiały pomocnicze do wykładu

Additional bibliography:

1. Izydorczyk J., Konopacki J.: Filtry analogowe i cyfrowe. Wyd. Pracowni Komputerowej Jacka Skalmierskiego, 2003.
2. Mohan N., Undeland T., Robbins W.: Power Electronics Converters Applications and Design. NY 1989
3. Tunia H., Winiarski B.:Energoelektronika. WNT, 1994.
4. Hambley A.R.: Electronics. Prentice-Hall, Inc , 2000.
5. Izydorczyk J: PSpice komputerowa symulacja układów elektronicznych. Wyd Helion, Gliwice 1993.
6. Król A., Moczko J.: PSPICE Symulacja i optymalizacja układów elektronicznych. Nakom, 1998.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lecture classes	20
2. Participation in the consultation on the lecture	4
3. Exam Preparation	30
4. Participation in the exam	6
5. Participation in laboratory activities	10
6. Preparation for laboratory	30
7. Development of domestic reports of exercise	20
8. Participation in the consultation on laboratory exercises	10

Student's workload

Source of workload	hours	ECTS
Total workload	130	4

Contact hours	50	1
Practical activities	70	1