

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Podstawy elektroniki 1**
 Name in English: **Basics of Electronics 1**
 Main field of study (if applicable): **Control Engineering and Robotics**
 Specialization (if applicable):
 Level and form of studies: **1st level, full-time**
 Kind of subject: **obligatory**
 Subject code: **ARR043302**
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30				
Number of hours of total student workload (CNPS):	60				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	2				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has a basic knowledge of mathematics.
2. Has a basic knowledge of physics.
3. Is able to apply the knowledge of the above to analysis of linear circuits.
4. Is aware of their responsibility for their own work.

SUBJECT OBJECTIVES

- C1. Awareness of the importance use of electronic circuits in engineering practice.
 C2. Provides with the basic properties of electronic components.
 C3. Provides with the methods of the description of a model of electronic components and parameters used in the description.
 C4. To provide students with simple electronic circuits - applications of elements: analog linear and non-linear and digital.
 C5. Provide with the purpose and way of describing the operation of electronic circuits.
 C6. Provide with the methods: qualitative and quantitative analysis of the properties based on the properties of elements, use this analysis to some simple circuits.

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Has basic knowledge in the area of work of electronic elements and describes them by the circuit model
 PEK_W02 Differentiates and analyses simple electronic systems – analog and digital, knows the basis of interaction between them
 PEK_W03 Knows the methods and means of using of analysis of properties of simple electronic systems

*relating to skills:**relating to social competences:*

- PEK_K01 Understands the need and knows the possibility of lifelong learning and vocational skills development,

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introduction, the scope of the subject. Semiconductors. Junctionless semiconductor devices	2
Lec 2	Semiconductor junction, diodes. Structures of the AC/DC adapters.	2
Lec 3	Rectifiers and filters. Stabilizer: concept, types, operating parameters. Active four-pole and its description, Effect of interaction between four-poles.	2
Lec 4	Frequency band limiting circuits. Bipolar transistor, operating conditions and circuits, characteristics and parameters.	2
Lec 5	Applications bipolar transistor: operating point, linear converters of alternating signals, switch, current stabilizer.	2
Lec 6	Field effect transistors, work rules, operating conditions, characteristics. Descriptive parameters and equivalent circuit at the operating point. Applications FET: operating point, a current source, linear converters of alternating signals, switch.	2
Lec 7	Differential amplifier, the parameters. The monolithic differential operational amplifier, structure and specific of use. Basic signal converters on idealized operational amplifier.	2
Lec 8	Properties of a real operational amplifier and its effect on the circuits. Advanced linear converters of signals on operational amplifiers.	2
Lec 9	Non-linear circuits on operational amplifiers. Basic elementary theory of feedback.	2
Lec 10	Applications of feedback. Examples of circuits on operational amplifier. Generation of periodic signals	2
Lec 11	Generators: Relaxation, Four-pole and Function generator. Compensating stabilizers. The basic blocks, the operating parameters.	2
Lec 12	Application circuits of compensating stabilizers: operating continuous and pulsed. Introduction to digital technique, binary logic.	2
Lec 13	Digital techniques. Combinational circuits.	2
Lec 14	Sequential circuits.	2
Lec 15	Final test	2
Total hours:		30

TEACHING TOOLS USED
N1. Information traditional lecture, presentation of slides and/or transparencies.
N2. Consultation.
N3. Own independent work - self-study and preparation for the test.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEK_W01 PEK_W02 PEK_W03 PEK_K01	Test
P(w)	P = F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Madej P., Zadania z rozwiązaniami z elementarnej techniki układowej w elektronice, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2014.
[2] Madej P., Ćwiczenia laboratoryjne z Podstaw Elektroniki, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2014.
[3] Tietze U., Schenk Ch., Układy półprzewodnikowe, WNT, Warszawa 2009
[4] Rusek M., Pasierbiński J., Elementy i układy elektroniczne w pytaniach i odpowiedziach, WNT, Warszawa 2006
[5] Kulka Z., Nadachowski M., Zastosowania wzmacniaczy operacyjnych, WNT, Warszawa 1986.
SECONDARY LITERATURE:
[1] Pióro B., Pióro M., Podstawy elektroniki, cz. 1 i 2, Wyd. Szkolne i Pedagogiczne, Warszawa 1997
[2] Horowitz P., Hill W., Sztuka elektroniki, WKŁ, Warszawa 2003
[3] Kaźmierkowski M. P., Matysik J. T., Wprowadzenie do elektroniki i energoelektroniki, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005
[4] Nowaczyk E., Nowaczyk J., Podstawy elektroniki: materiały pomocnicze do ćwiczeń projektowo-laboratoryjnych, Oficyna Wydawnicza PWr., Wrocław 1995
[5] Kalisz J., Podstawy elektroniki cyfrowej, WKŁ, Warszawa 1991
[6] Górecki P., Wzmacniacze operacyjne: podstawy, aplikacje, zastosowania, Wyd. BTC, Warszawa 2004

SUBJECT SUPERVISOR

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**MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ARR043302 - Basics of Electronics 1
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Control Engineering and Robotics**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	K1AiR_W20	C.1 C.2 C.3 C.4 C.5 C.6	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2 N.3
PEK_W02	K1AiR_W20	C.1 C.2 C.3 C.4 C.5 C.6	Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2 N.3
PEK_W03	K1AiR_W20	C.1 C.4 C.5 C.6	Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2 N.3
PEK_K01	K1AiR_K01	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2