

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Podstawy elektroniki 2**
 Name in English: **Basics of Electronics 2**
 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: **ARR043303**
 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 :			2		
including number of ECTS points for direct teacher-student contact (BK) classes:			1.40		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- Has a basic knowledge in the field of electronic components, describes their function peripheral model, distinguishes and
1. characterizes simple analog and digital circuits, knows the rules of cooperation and the methods of analysis of the properties.
 2. Can obtain information from literature, databases, and other resources necessary to solve elementary engineering problem.
 3. Can safely perform measurements of electrical quantities using analog and digital apparatus and oscilloscope.

SUBJECT OBJECTIVES

- C1. Raising students' awareness practical applicability electronic components and circuits (analog and digital) for their use in engineering practice.
 C2. Learn how to calculate and design of simple electronic circuits.
 C3. Manufacturing ability to apply measurement techniques to define the characteristics and parameters of electronic components.
 C4. Practical skills of connecting electronic circuits and test their basic parameters.
 C5. Learn how to interpret the test results of components and circuits and their critical evaluation.

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:**relating to skills:*

- PEK_U01 Can calculate the circuit parameters and the parameters of the elements it is formed of, and to design simple circuits by oneself
 PEK_U02 Can connect the electronic circuit on the basis of the scheme and to made measure of them.
 PEK_U03 Can compare the results of theoretical and experimental activity, present them in the numerical and graphical form, to interpret the results and to draw related conclusions.

relating to social competences:

- PEK_K01 Understands the responsibility for his own work and the subordination to the work in team, as well as the responsibility for the common realized tasks

PROGRAMME CONTENT

Form of classes - laboratory		Number of hours:
Lab 1	Introduction. Rules of the user safety and work. Rules of pass the laboratory	2
Lab 2	Passive linear circuits of signal processing.	2
Lab 3	Semiconductor diodes and their models	2
Lab 4	Current sources with transistors.	2
Lab 5	Linear signal converter with bipolar transistor.	2
Lab 6	Linear signal converter with FET.	2
Lab 7	Operational Amplifier - actual performance. Voltage follower and inverting amplifier.	2
Lab 8	Linear signal converters with operational amplifier. An inverting amplifier, converter u/i.	2
Lab 9	The differential amplifier with operational amplifier.	2
Lab 10	Nonlinear signal converters with operational amplifier. A log circuit, measuring the AC-DC converter.	2
Lab 11	Sine wave generator.	2
Lab 12	Square and triangular waves generator.	2
Lab 13	Digital combinational circuits.	2
Lab 14	Sequential logic circuits.	2
Lab 15	Summary of the laboratory	2
Total hours:		30

TEACHING TOOLS USED

- N1. Laboratory studies in student groups, using specialized teaching containers with the help of audio-visual.
 N2. Own work, preparation of the laboratory.
 N3. Consultation.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation <i>F - forming (during semester) P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(L)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Laboratory preparation
F2(L)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Activity
F3(L)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Reports
P(L)	$P = 0,3F1 + 0,2F2 + 0,5F3$	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Madej P., Ćwiczenia laboratoryjne z Podstaw Elektroniki, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2014.
 [2] Madej P., Zadania z rozwiązaniami z elementarnej techniki układowej w elektronice, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2014.
 [3] Tietze U., Schenk Ch., Układy półprzewodnikowe, WNT, Warszawa 2009
 [4] Kulka Z., Nadachowski M., Zastosowania wzmacniaczy operacyjnych, WNT, Warszawa 1986
 [5] Nowaczyk E., Nowaczyk J., Podstawy elektroniki: materiały pomocnicze do ćwiczeń projektowo-laboratoryjnych, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 1995

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] Rusek M., Pasierbiński J., Elementy i układy elektroniczne w pytaniach i odpowiedziach, WNT, Warszawa, 2006
 [4] Kalisz J., Podstawy elektroniki cyfrowej, WKŁ, Warszawa 1991
 [5] 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
ARR043303 - Basics of Electronics 2
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_U01	K1AiR_U18	C.1 C.2	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10 Lab11 Lab12 Lab13 Lab14 Lab15	N.2 N.3
PEK_U02	K1AiR_U18	C.1 C.3 C.4	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10 Lab11 Lab12 Lab13 Lab14 Lab15	N.1 N.2 N.3
PEK_U03	K1AiR_U18	C.1 C.5	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10 Lab11 Lab12 Lab13 Lab14 Lab15	N.1 N.2 N.3
PEK_K01	K1AiR_K03	C.2 C.3 C.4 C.5	Lab1 Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10 Lab11 Lab12 Lab13 Lab14 Lab15	N.1 N.2 N.3