

FACULTY W-8/ DEPARTMENT.....					
<b>SUBJECT CARD</b>					
Name in Polish ...Podstawy Elektroniki i Miernictwa.....					
Name in English...Electronics and Metrology – basic principles					
Main field of study (if applicable): Computer Science (studia w j. angielskim)					
Specialization (if applicable): .....					
Level and form of studies: 1st/ <del>2nd</del> * level, full-time / part-time*					
Kind of subject: obligatory / optional / <del>university wide</del> *					
Subject code ... INZ0252Wc , INZ0256L .....					
Group of courses YES / <del>NO</del> *					
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30	15	30		
Number of hours of total student workload (CNPS)	150		60		
Form of crediting	Examination / crediting with grade*				
For group of courses mark (X) final course	X	X			
Number of ECTS points	5		2		
including number of ECTS points for practical (P) classes			1		
including number of ECTS points for direct teacher-student contact (BK) classes	3		1,2		

\*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Basic knowledge of the Mathematical Analysis and Physics

**SUBJECT OBJECTIVES**

C1 Introducing the students to the principles of the work of semiconductor devices

C2 Take possession of the basic knowledge about the physical properties of the semiconductor materials, band theory of the materials and main properties of the bipolar and unipolar devices.

C3 Presentation of the principles of the measurements of electrical quantities and the basics of the electronic circuits and optoelectronics.

## SUBJECT EDUCATIONAL EFFECTS

### relating to knowledge:

PEK\_W01 has the knowledge about electric current flow in electric circuit

PEK\_W02 knows the rules of the work and main applications of the semiconductor devices

PEK\_W03 has the knowledge about electrical measurements

### relating to skills:

PEK\_U01 knows how to analyze and make projects of the linear electric circuits

PEK\_U02 knows how to analyze and project of the nonlinear electric circuits

PEK\_U03 knows how to project the stabilizer with Zener's diode

### relating to social competences:

PEK\_K01 knows how to search and choose the proper literature

PEK\_K02 understand the role of the systematic work

PEK\_K03 knows how to use the electronics in different applications

## PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	<i>The circuit of the direct current. RLC circuits</i>	2
Lec 2	<i>The basics of the electronics measurements</i>	2
Lec 3	<i>Physical basics of the semiconductor materials</i>	2
Lec 4	<i>P-n junction principle of the operation, and its properties</i>	2
Lec 5	<i>Semiconductor's diodes and their applications in electronic circuits</i>	2
Lec 6	<i>Bipolar transistors, principles of the operation, characteristics, applications in electronic circuits</i>	2
Lec 7	<i>Field Effect Transistors, principles of the operation and applications in electronic circuits</i>	2
Lec 8	<i>Integrated circuits, methods of the realization of semiconductor devices</i>	2
Lec 9	<i>Logic gates and inverters</i>	2
Lec 10	<i>Semiconductor memories</i>	2
Lec 11	<i>Non semiconductor memories</i>	2
Lec 12	<i>D/A and A/D converters</i>	2
Lec 13	<i>Linear integrated circuits</i>	2

Lec 14	<i>Optoelectronic</i>	2
Lec 15	<i>Colloquy</i>	2
	Total hours	30
<b>Form of classes - class</b>		<b>Number of hours</b>
Cl 1	<i>Organization time</i>	1
Cl 2	<i>Connections of the electronics elements, Kirchoff's, Norton's and Ohm's laws</i>	2
Cl 3	<i>Analysis of the circuits with nonlinear elements</i>	2
Cl 4	<i>Zener's diode as a voltage stabilizer</i>	2
Cl 5	<i>Charging and discharging capacitor</i>	2
Cl 6	<i>Voltage divider, RLC circuits</i>	2
Cl 7	<i>Resonance circuits</i>	2
Cl 8	<i>Colloquy</i>	2
	Total hours	15
<b>Form of classes - laboratory</b>		<b>Number of hours</b>
Lab 1	<i>Organization time</i>	2
Lab 2	<i>Measurements resistance of the resistors. Relative and absolute errors calculations</i>	2
Lab 3	<i>Serial and parallel connections of the resistors, Total resistance</i>	
Lab 4	<i><math>I=f(U)</math> characteristic of the p-n junction</i>	2
Lab 5	<i>Zener's diode, project of the stabilizer</i>	2
Lab 6	<i>Static characteristics of the bipolar transistors</i>	2
Lab 7	<i>Frequency limitations of the bipolar transistors</i>	2
Lab 8	<i>Static characteristics of the unipolar transistors</i>	2
Lab 9	<i>Static characteristics of the TTL logical gates</i>	2
Lab 10	<i>The measurement of the power consumption of the TTL and CMOS gates</i>	2
Lab 11	<i>Dynamic characteristics of the TTL and CMOS logical</i>	2
Lab 12	<i>Transoptors</i>	2
Lab 13	<i>Using oscilloscope to the measurement characteristics of the electronic elements</i>	2
Lab 14	<i>Additional laboratory</i>	2
Lab 15	<i>Additional laboratory</i>	2
	Total hours	30
<b>Form of classes - project</b>		<b>Number</b>
Proj 1		
Proj 2		
Proj 3		

Proj 4		
...		
	Total hours	
<b>Form of classes - seminar</b>		<b>Number of hours</b>
Sem 1		
Sem 2		
Sem 3		
...		
	Total hours	
<b>TEACHING TOOLS USED</b>		
N1. Lecture – use of multimedia		
N2. Laboratory – traditional method		
N3. Consultations		
N4. Work of personal student		

**EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT**

<b>Evaluation</b> (F – forming (during semester), P – concluding (at semester end))	<b>Educational effect number</b>	<b>Way of evaluating educational effect achievement</b>
F1 Laboratory	PEK_U01, PEK_U02, PEK_U03, PEK_K01	reports
F2 Classes	PEK_U01-PEK_U03	tests
P1 Lecture	PEK_W01, PEK_W02, PEK_W03, PEK_K02, PEK_K03	Final colloquy at the end of the semester

**PRIMARY AND SECONDARY LITERATURE**

**PRIMARY LITERATURE:**

- [1] [1] A. Zatorski, Podstawy miernictwa elektrycznego, Kraków AGH, 2011
- [2] J. Hennel, Podstawy elektroniki półprzewodnikowej, Warszawa, Wydawnictwo NT 2003

**SECONDARY LITERATURE:**

- [1] [1] A. Świt, J. Pułtorak, Przyrządy Półprzewodnikowe, Warszawa, WTN 1979
- [2] S. Lebson, Podstawy miernictwa elektrycznego, WNT, 1972

**SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)**

**dr hab. inż. Janusz Martan prof. PWr, janusz.martan@pwr.wroc.pl**

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**Electronics and Metrology – basic principles**.....  
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY  
 .....**INFORMATYKA**.....  
 AND SPECIALIZATION .....

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 (knowledge)	K1INF-W08	C1	Lec 1	1,3,4
PEK_W02	K1INF-W08	C2, C4	Lec 3-Lec 13	1,3,4
PEK_W03	K1INF-W08	C3	Lec2	1,3,4
...				
PEK_U01 (skills)	K1INF-W07, K1NF-U-14	C2, C3	L2, L3	2,3,4
PEK_U02	K1INF-W07, K1NF-U14	C2-C4	L4, L6-L12	2,3,4
PEK_U03	K1INF-W07, K1INF-U14	C2, C3	L4, L5	2,3,4
PEK_K01 (competences)	K1INF_K01 K1INF_K02 K1INF_K03	C1-C4	lec1-Lec14 L2-L13	1-4
PEK_K02	K1INF_K01 K1INF_K02 K1INF_K03	C1-C4	Lec1-Lec14 L2-L13	1-4
PEK_K03	K1INF_K01 K1INF_K02 K1INF_K03	C1-C4	Lec1-Lec14 L2-L13	1-4

\*\* - enter symbols for main-field-of-study/specialization educational effects

\*\*\* - from table above