VELEUČILIŠTE U KARLOVCU
Karlovac University of Applied Sciences

SYLLABUS PREDMETA

General information

Course title:	Electronics 1
ISVU[1] course code:	38250
Studies in which the course is taught:	Professional Study Programme of Mechatronics
Course Instructor:	Anamarija Kirin
Course Assistant:	-
ECTS credits:	5.0
Semester of the course execution:	III
Academic year:	2022/2023
Exam prerequisites:	-
Lectures are given in a foreign language:	english
Aims:	After this course students will understand basic physical properties of semiconductors, principles of electronic elements, and analysis and design of basic electronic circuits.

Course

Course structure	Number of contact hours per week:	Number of contact hours per semester:	Student's requirements by type of teaching:
Lectures:	2	30	attendance 80%
Tutorials:	2	24	attendance 80%
Practical (lab) sessions:	2	6	attendance 100%
Seminars:	-	-	
Field work:	-	-	
Other:	-	-	
TOTAL:	4	60	

Monitoring of students' work, knowledge evaluation and learning outcomes

Formation of the grade during the implementation of teaching: (Define from minimum 5 to maximum 10 learning outcomes)	**LEARNING OUTCOMES** (upon completion of the course the student should be able to:)	**FACTORS AFFECTING THE GRADE** (e.g. term paper, practical work, presentation, ...)	**MAXIMUM NUMBER OF POINTS PER FACTOR**
	I 1: Define the basic physical quantities of semiconductors, insulators (types, charge carriers, energy diagram, drift, diffusion)		
	I 2: Explain the properties of semiconductor PN junction (equilibrium, potential barrier, I-O dependence, temperature influence, impurity concentrations), metal-semiconductor junction (Ohmic and Shottky contact)		
	I 3: Apply the properties of a PN junction to diodes		
	I 4: Apply the properties of a PN junction to bipolar transistors		
	I 5: Apply the properties of a PN junction to unipolar transistors		
	I 6: Compare the properties of different designs of semiconductor rectifiers, amplifiers, filters and electronic switches		

[1] ISVU – Information System of Higher Education Institutions in Croatia

VELEUČILIŠTE U KARLOVCU
Karlovac University of Applied Sciences

SYLLABUS PREDMETA

Alternative formation of the grade (I 1 – I 10)	**or alternative formation of the grade: I 1 – I 6** written exam 70% of final grade-I1. I2, I3, I4, I5, I6 oral exam 30% of final grade	TOTAL: 100 points
Students' competencies	Students will have a general understanding of signal processing models and signal processing systems and will be able to design basic filter types.	

Prerequisites for course approval (lecturer's signature):	attendance
Prerequisites for taking exams:	lecturer's signature
Grading scale:	(According to the Regulations on student assessment of Karlovac University of Applied Sciences, Article 9, Paragraph 5) 90-100 - excellent (5) (A) 80 to 89.9 - very good (4) (B) 65 to 79.9 - good (3) (C) 60 to 64.9 - sufficient (2) (D) 50 to 59.9 - sufficient (2) (E) 0 to 49.9 – fail (1) (F) Students are graded during class, what forms 70% of final exam. Students who achieve 50% (35 points) and more are allowed to take the final exam. The score on final exam makes 30% of the final grade.

ECTS structure

ECTS credits allocated to the course reflect the total burden to the student during adoption of the course content. Total contact hours, relative gravity of the content, effort required for exam preparation, as well as, every other possible burden are taken in account:

Attendance (active participation)	**Term paper**	**Composition**	**Presentation**	**Continuous assessment and evaluation**	**Practical work**
0.5	**-**	**-**	**-**	**-**	**1,0**
Independent work	**Project**	**Written exam**	**Oral exam**	**Other**	
-	**-**	**2**	**1.5**	**-**	

Review of topics/units per week associated with learning outcomes

Week	Lectures topics/units and learning outcomes:	Tutorials topics/units and learning outcomes:
1.	Physical properties of crystals **I1**	Analysis of structural properties **I1**
2.	Semiconductor materials, semiconductor doping **I1**	Analysis of P and N type semiconductors doping **I1**
3.	Energy band diagrams and charge carriers in semiconductors **I1**	Carrier concentration analysis, density functions **I1**
4.	Transient effects, electric field formation, charge carrier flow (drift, diffusion), conductivity and resistance **I1**	Analysis of drift and diffusion effects, semiconductor layer conductivity **I1**
5.	PN barrier - properties, I-O characteristic, Ohmic and Shottky metal-semiconductor contact **I2**	PN barrier analysis, semiconductor energy diagram with Ohmic and Shottky electrode contact **I2**
6.	Basic characteristics of diodes **I3**	Analysis of PN junction diodes **I3**
7.	Diode applications **I3**	Diode application examples **I3**
8.	Basic characteristics of bipolar transistors **I4**	Analysis of bipolar transistor operation **I4**

9.	Application of bipolar transistors **I4**	Examples of bipolar transistor applications **I4**
10.	Basic characteristics of MOSFET **I5**	Analysis of MOSFET operation **I5**
11.	MOSFET application **I5**	Examples of MOSFET applications **I5**
12.	Basic characteristics of JFET **I5**	Analysis of JFET operation **I5**
13.	JFET application **I5**	Examples of JFET applications **I5**
14.	Properties and applications of single-stage amplifiers with transistors **I6**	Operational analysis of single stage amplifiers with transistors **I6**
15.	Differential amplifier with a symmetric input **I6**	Analysis of amplifier operation with symmetric input **I6**

References

REFERENCES (compulsory/additional):
Boylestad, R., Nashelsky, L., Electronic Devices and Circuit Theory, Pearson; 11th edition, 2012 Cathey, J. J., Schaum's Outline of Electronic Devices and Circuits, McGraw-Hill; 2nd edition, 2002

Exams for the academic year: 2022/2023

Exam dates:	According to the schedule of exams for academic year : 2022/2023

Contact information

1. Course Instructor/Lecturer:	Anamarija Kirin
e-mail:	akirin@vuka.hr
Office hours / Consultations:	Wednesday, 11:00, room 110, Ivana Meštrovića 10