COURSE SYLLABUS

General information

Course title:	Electronics 1
ISVU course code:	38250
Course instructor:	Anamarija Kirin
Course assistant:	-
Study programme and specialization in which the course is taught:	Mechatronics
ECTS credits:	5.0
Semester of the course execution:	III
Exam prerequisites:	-
Course objectives:	After this course students will understand basic physical properties of semiconductors, principles of electronic elements, and analysis and design of basic electronic circuits.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	attendance 80%
Exercises (auditory, linguistics):	24	attendance 80%
Exercises (laboratory, practical):	6	attendance 100%
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Partial exam 1	Partial exam 2	Partial exam 3	Oral	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Define the basic physical quantities of semiconductors	10			15	25	12,5	End of the academic year
Outcome 2	Explain the properties of semiconductor PN junction and semiconductor diodes		20		5	25	12,5	End of the academic year
Outcome 3	Apply the properties of a PN junction to bipolar transistors			20	5	25	12,5	End of the academic year
Outcome 4	Apply the properties of a PN junction to unipolar transistors			20	5	25	12,5	End of the academic year
Total % grade points		10	20	40	30	100	50	
Share in ECTS		0,5	1,0	2,0	1,5	5,0		

Knowledge evaluation on exams

Exam prerequisites	Attendance

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OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Define the basic physical quantities of semiconductors	10	15	25	12,5
Outcome 2	Explain the properties of semiconductor PN junction and semiconductor diodes	20	5	25	12,5
Outcome 3	Apply the properties of a PN junction to bipolar transistors	20	5	25	12,5
Outcome 4	Apply the properties of a PN junction to unipolar transistors	20	5	5	12,5
Total % of grade points		70	30	100	50
Share in ECTS		3,5	1,5		

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Physical properties of crystals	O1	Analysis of structural properties	O1
2.	Semiconductor materials, semiconductor doping	O1	Analysis of P and N type semiconductors doping	O1
3.	Energy band diagrams and charge carriers in semiconductors	O1	Carrier concentration analysis, density functions	O1
4.	Transient effects, electric field formation, charge carrier flow (drift, diffusion), conductivity and resistance	O1	Analysis of drift and diffusion effects, semiconductor layer conductivity	O1
5.	PN barrier - properties, I-O characteristic, Ohmic and Shottky metal-semiconductor contact	O2	PN barrier analysis, semiconductor energy diagram with Ohmic and Shottky electrode contact	O2
6.	Basic characteristics of diodes	O2	Analysis of PN junction diodes	O2
7.	Diode applications	O2	Diode application examples	O2
8.	Basic characteristics of bipolar transistors	O3	Analysis of bipolar transistor operation	O3
9.	Application of bipolar transistors	O3	Examples of bipolar transistor applications	O3
10.	Differential amplifier with a symmetric input	O3	Analysis of amplifier operation with symmetric input	O3
11.	Basic characteristics of MOSFET	O4	Analysis of MOSFET operation	O4
12.	MOSFET application	O4	Examples of MOSFET applications	O4
13.	Basic characteristics of JFET	O4	Analysis of JFET operation	O4
14.	JFET application	O4	Examples of JFET applications	O4
15.	Properties and applications of single-stage amplifiers with transistors	O3, O4	Operational analysis of single stage amplifiers with transistors	O3, O4

References (compulsory / additional)

1. Boylestad, R., Nashelsky, L., Electronic Devices and Circuit Theory, Pearson; 11th edition, 2012
2. Cathey, J. J., Schaum's Outline of Electronic Devices and Circuits, McGraw-Hill; 2nd edition, 2002