COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronic circuits

Course

Field of study
Mechatronics

Year/Semester
1/1

Area of study (specialization)

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Electrical engineering, knowledge of basic electronic elements. Ability to design and assemble electronic circuits. Basics of microprocessor controllers. Design of printed circuit boards. Understands the importance of electronics in mechatronic devices.

Course objective

Extending knowledge of electronics, especially in the field of designing electronic circuits. Acquainting with the construction, operation and design of various electronic circuits with the use of advanced components and integrated circuits.

Course-related learning outcomes

Knowledge

Extended knowledge of the parameters and characteristics of various electronic components

Knowledge of the inaccuracy of selected operational amplifiers, methods of their compensation and systems of measuring amplifiers

Knowledge of the construction and design of power supplies

Knowledge of power elements and power amplifier circuits

Knowledge of integrated circuits: AC, CA, Uf converters, generators, timing, filters,

Knowledge about GAL, FPGA

Learning about the construction of various electronic systems, e.g. motor control, measurement sensors (inductive, capacitive), accelerometers and gyroscopes, etc.

Knowledge of the basics of HDL, VHDL, and Verilog languages

Skills

Is able to design and build an electronic system based on operational and measurement amplifiers

He can select components and integrated circuits and design various circuits, e.g. time, filtering, etc.

Is able to select integrated circuits and design a power supply, power amplifier, AC converter, etc.

He can design systems cooperating with measuring sensors and motors

Social competences

Understands the need for lifelong learning; can inspire and organize the learning process of other people

He/She is aware of the role of electronics in the modern engeneering and its importance for society and the environment

Can define priorities for the implementation of a specific task

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Completion of the course: Passed on the basis of an test consisting of 5 general questions (for a correct answer to each question - 1 point. Grading scale: less than 2.6 points - 2, 2.6 ÷ 3.0 - 3.0, 3.1 ÷ 3.5 points - 3.5, 3.6 ÷ 4.0 points - 4.0, 4.1 ÷ 4.5 points - 4.5, 4.6 ÷ 5.0 points - 5.0 very good)

Project of two electronic circuits.

Programme content

1. Noise and interference in electronics

2. Electronic components - review of the types of diodes, transistors and thyristors and their parameters

3. High power transistors, power amplifier circuits, modeling of electronic circuits

4. Construction of class A, B, D amplifiers, integrated power amplifiers

5. Voltage stabilizers, switching power supplies

6. Perfect and real operational amplifiers

7. Systems with operational amplifiers, including non-linear ones,

8. Measuring amplifiers, with processing, low-noise

9. Advanced, sample integrated circuits, e.g. converters AC, CA, Uf, etc.

10. GAL, FPGA circuits, examples of control circuits

11. Integrated sensors (accelerometers, gyro etc.)

12. Basics of HDL, VHDL and Verilog languages

13. Integrated circuits for motor control

14. Selected examples

15. Completion of the course

Teaching methods

Lecture with presentations and examples, explanations using the blackboard, on-line catalogs, modelling and simulations of circuits

Bibliography

Basic

1. The Art of Electronics Hardcover , 2015, Paul Horowitz , Winfield Hill

2. Career Paths. Electronics. Student's Book. Evans Virginia, Dooley Jenny, Taylor Carl

3. Eggleston, Dennis L. Basic Electronics for Scientists and Engineers, Cambridge University Press

4. Company catalogs: Texas Instruments, Analog Devices, Maxim, Farnel

Additional

James M. Fiore, Operational Amplifiers and Linear Integrated Circuits, Publisher: Mohawk Valley Community College 2018

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	30	1,0

[1] delete or add other activities as appropriate