COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronics [N1Mech2>PEN1]

Course

Field of study
Mechatronics

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
8

Laboratory classes
0

Other
0

Tutorials
8

Projects/seminars
0

Number of credit points

2,00

Coordinators

Lecturers

Prerequisites

Physics in the field of the structure of matter, electricity, magnetism, em field and electrical engineering. Ability to calculate DC and AC electric circuits. Knowledge of RLC passive elements.

Course objective

Familiarization with the structure, operation and characteristics of active electronic components, especially integrated circuits, and teaching the basics of component selection, design and start-up of selected electronic systems. Familiarization with selected integrated circuits and their applications. Acquisition of basic knowledge on the design of electronic systems.

Course-related learning outcomes

Knowledge:
Electronic sensors, including integrated circuits.
Digital circuits: levels, signals, gates, integrated digital circuits.
Knowledge of AC and DC converters and class B amplifiers.
Operational amplifiers (OP) and design of circuits with these amplifiers. Power amplifiers.
Knowledge of batteries and power supplies with integrated circuits. Converters.
Knowledge of the most important integrated circuits and their practical applications.

Skills:
Can select electronic sensors. Can design various circuits based on operational amplifiers: inverting and non-inverting amplifier, adder and filter. Can design a power supply system and a power amplifier system. Can select an integrated circuit amplifier/DC motor driver.

Social competences:
Understands the need for lifelong learning; is able to inspire and organize the learning process of others
Is aware of the role of electronics in the modern economy and its importance for the development of society and the environment
Is able to 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:

EXAM: Written examination consisting of 5 questions (1 point for a correct answer to each question. Grading scale: below 2.6 points - ndst., 2.6÷3.0 - dst, 3.1÷3.5 pts. - dst+, 3.6÷4.0 pts. - db, 4.1÷4.5 pts. - db+, 4.6÷5.0 pts. - vdb).

Programme content

Electronics components as sensors. Power supply systems for electronics. Transistors and high-power systems. Integrated circuits. Operational amplifiers and their applications. Digital systems. PCBs and electronics assembly.

Course topics

1. Review of electronic sensors and sensor integrated circuits.
2. High-power transistors. Class B power amplifier circuits. Darlington circuit.
3. Batteries. Stabilizer integrated circuits. Power supplies and stabilizers. DC/DC converters.
4. Ideal and real operational amplifiers (OPA). Basic parameters and characteristics of OPA. Operating circuits. Compensation of OP nonlinearity.
5. Basics of digital circuits. TTL gates. Input/output voltages and currents, gate connection. Selected digital integrated circuits: flip-flops, registers, counters, multiplexers, etc. AC, CA, U/f converters.
6. Integrated power amplifiers. DC and stepper motor amplifiers/drivers. Generators.
7. Housings for electronic components and integrated circuits. PCB boards. Electronics assembly.

LAB.
1. Diode study
2. Rectifiers and stabilizers
3. Bipolar transistors
4. Unipolar transistors
5. Two-stage transistor circuits
6. Operational amplifier study
7. Circuits based on WO part 1 (amplifiers), part 2 (integrating), part 3 (nonlinear)
8. Thyristor circuits
9. Power amplifiers
10. Amplifiers and DC motor controllers
11. Timing circuits

Teaching methods

Lecture with presentations and examples, explanations using the table, on-line catalogues.

Bibliography

Basic:
1. Przezdziecki F. „Elektrotechnika i elektronika”.
2. Horowitz P., Hill W. „Sztuka elektroniki”.
3. Tietze U., Schenk Ch. „Układy półprzewodnikowe”.
4. Platt Ch., Elektronika. Od praktyki do teorii.

Additional:

1. Katalogi firm: Texas Instruments, Analog Devices, Maxim, Farnel
2. Eggleston, Dennis L. Basic Electronics for Scientists and Engineers, Cambridge University Press

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	26	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	49	2,00