COURSE DESCRIPTION CARD - SYLLABUS

Course name
Microprocessor technique [S1Elmob1>TM]

Course

Field of study
Electromobility

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of mathematics, electronics and computer science. The ability to understand and interpret the messages communicated and effective self-education in the field related to the selected field of study. Willingness to work individually and as part of a team.

Course objective

Getting to know the architecture and the basics of programming microprocessor systems and the principles of their cooperation with external devices at the basic level.

Course-related learning outcomes

Knowledge:
1. Knows the structure and principle of operation of analog and digital electronic, optoelectronic and power electronics systems; has general knowledge of teletransmission, technology and microprocessor systems, as well as PLC controllers and SCADA systems.
2. Has a structured and theoretically underpinned general knowledge of computer science key issues for the electromobility area, including programming and the use of IT tools in modeling, simulation and design.

3. Knows and understands the fundamental dilemmas of modern civilization related to the mass use of electromobility; is aware of the latest development trends related to the field of study.

Skills:
1. Is able use literature sources, integrate the obtained information, evaluate it and interpret it and draw conclusions in order to solve complex and unusual problems in the field of electromobility.
2. Is able test and diagnose simple systems and devices related to the area of electromobility and use them in accordance with the requirements and technical documentation.
3. Is able compare various technical solutions, evaluate them in terms of selected utility, economic, ecological, legal and ethical criteria.
4. On the basis of technical documentation, using appropriate methods, tools and materials, he is able to make and start up typical electrical and electronic systems and devices used in electromobility.

Social competences:
1. Understands the importance of improving professional, personal and social competences; is aware that knowledge and skills in the field of electromobility are evolving rapidly.
2. Understands the importance of knowledge in solving problems in the field of electromobility; is aware of the necessity to use the knowledge of experts when solving engineering tasks beyond their own competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture
Assessment of the knowledge and skills demonstrated in the written test-problem exam - based on the number of points obtained.
Laboratory
1. Continuous assessment, rewarding the increase in the ability to use the learned rules and methods.
2. Assessment of knowledge and skills related to the exercise, assessment of the exercise report.
3. Obtaining additional points for activity during classes, especially for:
- proposing to discuss additional aspects of the issue,
- effectiveness of applying the acquired knowledge while solving a given problem
- the ability to cooperate as part of a team practically carrying out a detailed task in the laboratory,
- remarks related to the improvement of teaching materials,
- continuous assessment, rewarding activity and substantive content of statements.

Programme content

The module program covers the following topics:
1/ basics of digital technology,
2/ microprocessor (uP) and microcontroller (uC),
3/ MCS51(R) family microcontrollers from INTEL,
4/ microcontrollers derived from the MCS51 family
5/ microcontrollers with ARM core,
6/ digital signal processors (DSP),
7/ evaluation tools.

Course topics

The lecture program covers the following topics:
1/ arithmetic and logical operations,
2/ logic gates and digital functional blocks,
3/ von Neumann architecture of microprocessor systems,
4/ architecture and list of uC commands of the MCS51(R) family,
5/ architecture and list of uC instructions of the ADuC7000 family from Analog Devices,
6/ uC architecture of the SAB80C500 family by INFINEON,
7/ HARVARD architecture of microprocessor systems,
8/ architecture and instruction list of the ADSP-21000 family of signal processors from Analog Devices.

The laboratory program covers the following topics:
1/ functions and rules of use of hardware and software development tools,
2/ basic principles of uP and uC programming - in ASSEMBLER and C/C++ language,
3/ real-time data processing - basic rules,
4/ digital filtering algorithms.

Teaching methods

1. The lecture with multimedia presentation (diagrams, formulas, definitions, etc.) supplemented with the content given on the blackboard. Introducing a new topic, preceded by a reminder of content related to other items.
2. The laboratory exercises: a multimedia presentation, a presentation illustrated with examples given on the blackboard and the implementation of tasks given by the teacher - practical exercises.

Bibliography

Basic
1. P. Misiurewicz, M. Grzybek, TTL semiconductor logic circuits (in polish), WNT, W-wa, 1982.
2. T. Starecki, 8051 microcontrollers in practice (in polish), BTC, W-wa, 2002.
3. P. Hadam, Design of microprocessor systems (in polish), Wydawnictwo BTC, W-wa, 2004.
4. J. Doliński, AVR microcontrollers in practice (in polish), Wyd. BTC, W-wa 2003.
5. R. G. Lyons, Introduction to digital signal processing (in polish), Issue II, WKŁ, W-wa, 2010.
6. A. Dąbrowski, Signal processing using the signal processors (in polish), Publishing House of Poznań University of Technology, Poznań, 2000.
Additional
1. T.P. Zieliński, Digital signal processing. From theory to applications. (in polish), Issue II, WKŁ, W-wa, 2014.
2. Technical documentation of selected microprocessor systems, their application notes, and educational materials - available on the websites of theirs manufacturers.

Breakdown of average student's workload

	Hours	ECTS
Total workload	83	3,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	38	1,50