POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name

PO11: Systems for monitoring, property protection and communication with vehicle users - Systems for data exchange and communication with vehicle users

Course

Field of study	Year/Semester
Electromobility	4/7
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	polish
Form of study	Requirements
full-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15		
Tutorials	Projects/seminars	
	15	

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

Ph.D. Grzegorz Trzmiel

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Faculty of Control, Robotics and Electrical Engineering

Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

M.Sc. Damian Głuchy

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phone: 616652840

Faculty of Control, Robotics and Electrical Engineering

Piotrowo 3A, 60-965 Poznań

Prerequisites

Knowledge of mathematical analysis, circuit theory, basics of signal processing, programming. Able to perform calculations resulting from the theory of circuits and verify their results, is able to operate computer programs and network communication tools. Can work and interact in a group.

Course objective

Getting to know modern information technologies used in electromobility systems. Application of specialized applications and communication methods in microprocessor information exchange systems. Presentation of the design principles and the selection of electrical and electronic components for

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communication. To familiarize students with the methods of collecting, transmitting and storing data in vehicle information systems and data transmission control systems in and between vehicles.

Course-related learning outcomes

Knowledge

1. has knowledge in the field of modeling of electrical and power systems,

2. has knowledge of designing information distribution systems,

3. has knowledge of IT systems and data transmission protocols used in electromobility systems.

Skills

1. is able to create models of basic systems and devices in electromobile systems,

2. knows how to use computer programs and IT technologies to design electronic systems in data exchange systems, gathering and presenting information in the field of electrical engineering

3. can apply and compare knowledge in the field of cooperation of property security systems with other installations.

Social competences

1. developing the skills to study independently, work in a group and acquire new knowledge,

2. understanding the impact of IT technology on the work of an engineer, on the security of the power system and the environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by an exam lasting about 60-90 minutes, consisting of 10-15 questions (open and close questions), variously scored. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be sent to students by e-mail using the university's e-mail system.

Skills acquired as part of the project classes are verified on the basis of: grades of completed projects concerning data exchange systems and/or communication systems. In addition, the following are taken into account for the final evaluation: rewarding the knowledge necessary to implement the problems posed in a given area of project tasks, activity during each class, rewarding the increase in the ability to use known principles and methods, assessment of knowledge and skills related to the implementation of the exercise task.

In addition, students can earn extra points for activity during classes, especially for: offering to discuss additional aspects of an issue, the effectiveness of applying the acquired knowledge when solving a given problem, the ability to cooperate within a team that practically performs a specific task in a laboratory, comments related to improving teaching materials, diligence and aesthetics of the developed tasks within self-study.

Programme content

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Monitoring the work of information systems (control and supervision systems) in vehicles. Application of microprocessor technique, recording of events, disturbances and processing of recorded measurement signals. Selected issues in the field of data transmission. CAN interface: properties, systems, types of frames, communication model, error detection mechanisms, concepts of node construction, electromagnetic interference, advantages. Data transmission interfaces, including: USB, LIN, Profibus, FlexRay, Most, Bluetooth, etc. The principles of designing electronic systems for the implementation of information exchange components in electromobile systems. Ways and rules of implementing physical applications. Prototyping hardware and software parts. Electromobility systems in Poland and beyond: definition, division and application. Charging methods and operating principles for electric vehicles. Calculation of electromobility costs. Using students 'knowledge of other subjects, initiating discussions, asking questions to increase students' activity and independence. Classes at the university supplemented with materials enabling independent preparation for classes and broadening of knowledge. The latest system solutions (hardware and software) concerning the subject matter of the classes are used.

Rules for preparing presentation of results of engineering calculations. Teaching support through extensive use of publicly available programs (open licenses), presentation of alternative sources allowing students to independently expand their knowledge and skills, learning to use individual skills in teamwork, encouraging students to design devices, transmission systems, developing experiments and programming on their own.

Project:

The use of computer equipment with a multimedia projector and dedicated software to explain and discuss selected aspects related to the design, selection and operation of selected data exchange and communication systems in vehicles and in production halls. Discussion with students about the current progress and problems in the implementation of the final project. Classes at the university supplemented with materials for independent performance of tasks on the free software packages available.

Teaching methods

Lectures: a multimedia presentation containing drawings, diagrams, photos, supplemented with practical examples on the blackboard, slides and computer programs, which makes it easier to link theory with practice. The lecture is supplemented with additional materials provided to students for independent study.

Project: The use of computer equipment with a multimedia projector and dedicated software. Individual and team work (design, selection, measurements, verification) using dedicated applications for the presentation and design of systems or subassemblies for data exchange and communication in vehicles and in production halls.

Bibliography

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Basic

1. Krzyżanowski R., Układy mikroprocesorowe, Mikom, Warszawa 2004.

2. Nawrocki W., Komputerowe systemy pomiarowe, Wydawnictwa Komunikacji i Łączności, 2006.

3. Nawrocki W., Rozproszone systemy pomiarowe, Wydawnictwa Komunikacji i Łączności, 2006.

4. Technical documentation, data sheets.

Additional

1. Cieciura M., Podstawy technologii informacyjnych z przykładami zastosowań, Vizja Press&It, 2016.

2. Francuz T., Język C dla mikrokontrolerów, od podstaw do zaawansowanych aplikacji, Helion, Gliwice 2011.

3. Tatjewski P., Sterowanie zaawansowane obiektów przemysłowych. Struktury i algorytmy, Akademicka Oficyna Wydawnicza EXIT, Warszawa, 2002.

4. Piasecki A., Trzmiel G., Remote building control using the bluetooth technology, Monograph Computer Applications in Electrical Engineering, Poznan University of Technology 2016, vol. 14, pp. 457 – 468.

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	35	1,5
Student's own work (literature studies, preparation for project classes and project preparation, preparation for the final test)[1]	35	1,5

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[1] delete or add other activities as appropriate