COURSE DESCRIPTION CARD - SYLLABUS

Course name
Research and problem laboratory

Course

Field of study
Automation and robotic

Year/Semester
1/2

Area of study (specialization)
Vision systems

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
0

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
30

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: The student starting this subject should have basic knowledge related to the selected topic of the master's thesis in the field of automation and robotics and know the basic methods, techniques and tools used in solving tasks in this field.

Social competences: The student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Skills: The student should have the ability to solve basic problems in the selected field and integrate knowledge from various areas of computer science and the ability to obtain information from the indicated sources. He should also understand the need to expand his competences.

Course objective

1. Practical use and consolidation of the student's knowledge in the field of control systems and control and measurement systems as well as the analysis and synthesis of selected control systems on the basis of an independently solved research problem in the field of automation and robotics

2. Developing students' ability to independently solve a given problem related to the issues from the first point

3. Shaping students' skills to share the obtained conclusions with the group and the ability to transfer the results of research work in an appropriate way.

Course-related learning outcomes

Knowledge

1. The student has an extended knowledge of selected areas of robotics [K_W10].

2. The student has theoretically founded detailed knowledge related to control systems and control and measurement systems [K_W11]

Skills

1. The student is able to critically use literature information, research data and other sources in Polish and a foreign language [K_U1].

2. The student is able to analyze and interpret technical design documentation and use the scientific literature related to a given problem [K_U2]

3. Can prepare a scientific study in the mother tongue and a short scientific report in English, presenting the results of own research [K_U4]

4.The student is able to prepare and present in Polish and in a foreign language an oral presentation on the results of his / her work (including research) defined by the project task [K_U5]

5. Has self-education skills in order to raise and update professional competences [K_U6]

6. He is able to formulate and verify (simulation or experimentally) hypotheses related to engineering tasks and simple research problems in the field of automation and robotics [K_U15]

Social competences

Social competences

1. The student understands the need and knows the possibilities of continuous training, improving professional, personal and social skills, can inspire and organize the learning process of other people [K_K1].

2. Is aware of the social role of a technical university graduate and understands the need to formulate and transmit to the society (in particular through the mass media) information and opinions on the achievements of automation and robotics in the field of research and application works and other aspects of engineering activities [K_K6]

3. Make efforts to provide such information and opinions in a commonly understandable manner with justification of various points of view [K_K6].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
formative assessment:

within the scope of the project, verification of the assumed learning outcomes is carried out by:

i. assessment of the student's preparation for individual project sessions and assessment of skills related to the implementation of the design and research task

ii. continuous assessment during each class (oral answers), rewarding the increase in the ability to use the learned rules and methods

iii. evaluation of the functioning of simulation programs prepared partly during the classes and partly after their completion; this assessment also includes teamwork

iv. assessment of knowledge and skills related to the implementation of a project-research task on the basis of a prepared and presented presentation at the forum of the group

v. evaluation and defense by the student of the report on the implementation of the independently completed design and research task

Obtaining additional points for activity during classes, especially for:

i. discuss additional aspects of the issue

ii. the effectiveness of applying the acquired knowledge while solving a given problem

iii. the ability to cooperate as part of a team practically carrying out a detailed task in the laboratory

iv. indicating the perceptual difficulties of students enabling the ongoing improvement of the teaching process

Programme content

The research and problem laboratory consists of design classes of 15 2-hour meetings. Each project is carried out by 2-person teams of students. The issues of interest and problems faced by student teams concern the practical use of knowledge and skills acquired within this field of study. Projects can also be of a research nature. Each team receives a task from the leader to solve it independently. The topics of the projects include issues in the field of automation and robotics: robot algorithms and control systems and their application, robot motion planning in simulation environments, e.g. Matlab / Simulink or in the high-level software language C / C ++, laboratory tests of selected algorithms and control methods on real objects , modeling of kinematics and dynamics of nonlinear, holonomic and niholonomic systems, control and measurement systems used in automation and robotics, including vision systems with the use of microcontrollers and DSP processors. As part of the course, students must correctly analyze and interpret any project technical documentation and / or properly use the scientific literature related to the given problem. At the end, each team must prepare and present in Polish or a foreign language a multimedia presentation on the results of the team's research work or description of the stages of implementation of an engineering project task.

Teaching methods

1. Design exercises: performing simulation and hardware experiments, discussion, work in a two-person team, multimedia show, demonstration of the operation of the control system and / or its measurement systems, solving practical problems by teams

Bibliography

Basic

Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	32	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	18	1,0

[1] delete or add other activities as appropriate