COURSE DESCRIPTION CARD - SYLLABUS

Course name
Term design [S1AiR1P>PP]

Course

Field of study
Automatic Control and Robotics

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
practical

Level of study
first-cycle

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
60

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

Knowledge: The student starting this course should have basic knowledge of the basics of robotics, measurement systems and microcontrollers, the theory of robot control and programming. Skills: Should have the ability to solve basic problems in the field of linear systems (state space description, control with feedback, feedforward, linearization) and nonlinear systems, and the ability to obtain information from indicated sources. He should also understand the need to expand his competences. Social competences: In addition, in terms of social competences, the student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

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 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. Has basic knowledge of selected areas of robotics and automation
2. Has a basic knowledge of control systems and control and measurement systems
3. Has knowledge of development trends and the most important new achievements in the field of automation and robotics and related scientific disciplines
Skills
1. Can critically use literature information, databases and other sources in Polish and a foreign language
2. Can analyze and interpret technical design documentation and use the scientific literature related to the given problem that needs to be solved by himself
3. Can prepare and present in Polish and in a foreign language an oral presentation on the results of his / her work defined by the project task
5. Has self-education skills in order to raise and update professional competences
6. Can verify (simulation or experimentally) hypotheses related to engineering tasks in the field of automation and robotics
Social competences
1. Understands the need and knows the possibilities of continuous learning and improving professional, personal and social competences, can inspire and organize the learning process of other people
2. Make efforts to provide opinions in a generally comprehensible manner

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative assessment:
based on the assessment of the current progress of the project task,
Summative 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 project task,
ii. continuous assessment during each class (oral answers) and 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 the ability to work in a team,
iv. assessment of knowledge and skills related to the implementation of the project task on the basis of a prepared and presented presentation in the forum of the group,
v. the student's assessment and defense of the report on the implementation of a project task performed independently,
Obtaining additional points for activity during classes, especially for:
i. effectiveness of applying the acquired knowledge while solving a given problem,
ii. the ability to cooperate as part of a team practically carrying out a detailed task in the laboratory,
iii. identifying students' perceptual difficulties enabling ongoing improvement of the teaching process.

Programme content

Transition project consists of project classes of 30 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. 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 movement planning in simulation environments, e.g. Matlab / Simulink or in high-level programming language C / C ++, laboratory tests of selected algorithms and control methods on real objects , modeling of kinematics and dynamics of nonlinear,

holonomic and nonholonomic 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 the possible design 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 a 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
1. Wprowadzenie do robotyki. Mechanika i sterowanie, J.J. Craig, WNT Warszawa, 1993.
2. Dynamika i sterowanie robotów, M.W. Spong, M. Vidyasagar, WNT, Warszawa 1997.
3. Manipulatory i roboty mobilne. Modele, planowanie ruchu, sterowanie, K. Tchoń, A. Mazur, I. Dulęba, R. Hossa, R. Muszyński, Akademicka Oficyna Wydawnicza, Warszawa, 2000.
4. Modelowanie I sterowanie robotów, K. Kozłowski, P. Dutkiewicz, W. Wróblewski, Wydawnictwo Naukowe PWN, Warszawa, 2003..
Additional
1. Modeling and Control of Robot Manipulators, Sciavicco, B. Siciliano, Springer-Verlag, London, 2000.
2. B. Siciliano, O. Khatib (Ed.), Handbook of Robotics, Springer 2009.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	63	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	62	2,50