COURSE DESCRIPTION CARD - SYLLABUS

Course name
Diploma work [S1AiR1E>PD]

Course

Field of study
Automatic Control and Robotics

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
90

Number of credit points

8,00

Coordinators

dr hab. inż. Konrad Urbański
konrad.urbanski@put.poznan.pl

dr hab. inż. Tomasz Pajchrowski prof. PP
tomasz.pajchrowski@put.poznan.pl

prof. dr hab. inż. Piotr Skrzypczyński
piotr.skrzypczynski@put.poznan.pl

prof. dr hab. inż. Dariusz Horla
dariusz.horla@put.poznan.pl

dr inż. Robert Bączyk
robert.baczyk@put.poznan.pl

Lecturers

Prerequisites

Knowledge: The graduates has an advanced knowledge and understanding of selected facts, objects and phenomena and the methods and theories relating to them that explain the complex relationships between them; he has a basic general knowledge of mathematics including algebra, geometry, analysis, probabilistic and elements of discrete mathematics and logic, including mathematical methods and numerical methods necessary to: ▪ describe and analyse the properties of linear and basic non-linear dynamic and static systems, ▪ the description and analysis of complex numbers, ▪ the description of random processes and uncertain quantities, ▪ the description and analysis of combinatorial and sequential

logic systems, ▪ description of control algorithms and stability analysis of dynamic systems, ▪ the description, analysis and methods of signal processing in the time and frequency domain, ▪ numerical simulation of dynamic systems in the continuous and discrete time domain [K1_W1 (P6S_WG)]. Has advanced structured knowledge of selected algorithms and data structures as well as procedural and object-oriented programming methodologies and techniques [K1_W8 (P6S_WG)]. Has a structured knowledge of computer architectures, computer systems and networks and operating systems including real-time operating systems [K1_W9 (P6S_WG)]. Has a basic knowledge of the handling and use of IT tools for the design, rapid prototyping, simulation and visualisation of automation and robotics systems and for recording the design of mechanical constructions [K1_W10 (P6S_WG)]. Knows and understands to an advanced degree the theory and methods in the architecture and programming of microprocessor systems, knows and understands selected high- and low-level microprocessor programming languages; knows and understands the principle of operation of basic peripheral modules and communication interfaces used in microprocessor systems [K1_W13 (P6S_WG)]. Skills: Is able to give a presentation of results on an engineering task in Polish and foreign language [K1_U5 (P6S_UK)]. Is able to construct an algorithm to solve a simple measurement and control task and implement, test and run it in a selected programming environment on a microprocessor platform [K1_U27 (P6S_UW)].

Course objective

The aim of the course is to familiarise students with the methodology and practical aspects of engineering design and the principles of preparing project documentation and scientific research documentation. The aim is also to develop the ability to apply previously acquired knowledge in practice and independently solve encountered problems.

Course-related learning outcomes

Knowledge:
Knows and understands typical engineering technologies, principles and techniques of construction of simple automation and robotics systems; knows and understands the principles of selection of executive systems, computational units and measurement and control elements and devices [K1_W20 (P6S_WG)].
Is familiar with the current status and latest development trends of the field of automation and robotics [K1_W21 (P6S_WG)].
Knows and understands the basic concepts and principles of industrial property protection and copyright; is able to use patent information resources [K1_W26 (P6S_WK)].
Skills:
Is able to obtain information from literature, databases and other sources also in a chosen foreign language [K1_U1 (P6S_UW)].
Can interpret with understanding the design technical documentation and simple technological diagrams of automation and robotics systems [K1_U2 (P6S_UW)].
Can prepare documentation concerning the realisation of an engineering task in Polish and foreign language [K1_U4 (P6S_UW)].
Has self-education skills to improve and update professional competences [K1_U6 (P6S_UU)].
Can design and practically use simple diagnostic and decision-making systems dedicated to automation and robotics systems [K1_U21 (P6S_UW)].
Be able to identify and formulate specifications for simple engineering tasks in the field of automation and robotics [K1_U23 (P6S_UW)].
Is able to evaluate the suitability of routine methods and tools for designing automation and robotics systems, and select and apply the appropriate method and tools [K1_U24 (P6S_UW)].
Social competences:
Is ready to critically assess his/her knowledge; understands the need for and knows the possibilities of continuous training - improving professional, personal and social competence, is able to inspire and organize the learning process of others [K1_K1 (P6S_KK)].
Is aware of the responsibility for his/her own work and is ready to follow the rules of teamwork and take responsibility for jointly implemented tasks; is able to lead a small team, set goals and determine priorities leading to the realisation of the task; is ready toto play a responsible professional role. [K1_K3 (P6S_KR)].
Is ready to prioritise in order to achieve a task defined by himself or others [K1_K4 (P6S_KO)].
The graduate is aware of the need for a professional approach to technical issues, meticulous familiarization with the documentation and environmental conditions in which the equipment and its components can operate. The graduate is ready to observe the rules of professional ethics and to demand it from others, to respect the diversity of opinions and cultures [K1_K5 (P6S_KR)].

The graduate is ready to fulfil social obligations and co-organise activities for the benefit of the social environment; is aware of the social role of a graduate of a technical university and understands the need to formulate and convey to the public (in particular through the mass media) information and opinions on the achievements of automation and robotics and other aspects of engineering activities; the graduate makes efforts to communicate such information and opinions in a generally understood manner [K1_K7 (P6S_KO)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory: Grades for the progress of the thesis and on the basis of the final report.
Project: Grades for project presentations related to the completion of the thesis elements.

Programme content

Development of practical skills to design and build devices within the scope of the thesis topic.

Course topics

Laboratory:
Develop skills in the analysis and design of selected electromechanical and microprocessor systems used in automation and robotics (and their software). Evaluation of project results. During laboratory classes, students solve tasks related to their diploma thesis.
Project:
Development and verification of practical design skills in the scope related to thesis topic. Analysis/ discussion of various methods of problem solving (including out-of-the-box) and preparation of engineering thesis. Detailed analysis and discussion of exemplary scientific papers, technical reports and projects. Multimedia presentation on the principles of preparing bibliographies. Overview of formal requirements and procedures in the conducting of dissertations and research.

Teaching methods

Workshop activities,
Multimedia presentations,
Case study,
Discussions .

Bibliography

Basic:
1. Kate L. Turabian, "A Manual for Writers of Research Papers, Theses, and Dissertations", University of Chicago Press; Ninth edition 2018.
2. American Psychological Association, "Publication Manual of the American Psychological Association": The Official Guide to APA Style. 7th ed. Washington, D.C. 2020.
3. Eco Umberto, “How to Write A Thesis“. The MIT Press 2015.
4. Zinsser W. "On writing well", New York 2006.
Additional:
1. Wrycza-Bekier J., Kreatywna praca dyplomowa: jak stworzyć fascynujący tekst naukowy, Gliwice, Wydawnictwo Helion, 2011.
2. Detyna B., Matuszek J., Szołtysek J, Praca dyplomowa inżynierska : poradnik metodyczny, Wałbrzych, Wydawnictwo Państwowej Wyższej Szkoły Zawodowej im. Angelusa Silesiusa, 2015.
3. Świsulski D. E-technologie w kształceniu inżynierów : otwarci na nowe wyzwania - wybieramy MOOC?, Zeszyty Naukowe Wydziału Elektrotechniki i Automatyki Politechniki Gdańskiej 41.
4. Eco U. Jak napisać prace dyplomową, Wydawnictwo Uniwerstytetu Warszawskiego, 2008.
5. Giernacki W. E-learning and comprehensive education of engineers in the EU, International Journal of Information and Education Technology, vol. 2, no. 6, pp. 587-590, December 2012.

Breakdown of average student's workload

	Hours	ECTS
Total workload	240	8,00
Classes requiring direct contact with the teacher	120	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	120	4,00