COURSE DESCRIPTION CARD - SYLLABUS

Course name

Automatics

Course

Field of study

Aerospace Engineering

Year/Semester

1/2

Area of study (specialization)

-

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

Ph.D., D.Sc. Wojciech Sawczuk

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Faculty of Civil and Transport Engineering

ul. Piotrowo 3, 60-965 Poznan

Responsible for the course/lecturer:

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Prerequisites

Knowledge: The student has a basic knowledge of automation, information technology and telecommunications, knows the basics of the theory of probabilistic processes, harmonic signals and graph theory.

Skills: Student is able to apply his knowledge in learning about and solving automation problems.

Social competencies: The student is able to determine the priorities important in solving the tasks set before him, he can effectively collaborate in the group taking on different roles.

Course objective

Understanding the role of automation in air transport in increasing safety and improving efficiency and effectiveness in traffic management and vehicle monitoring.

Course-related learning outcomes

Knowledge

1. has broadened knowledge, necessary for understanding of profile subjects and specialist knowledge about construction, methods of construction, manufacturing, operation, air traffic management, security systems, impact on the economy, society and the aviation and aerospace environment for selected specialties:

1. Aeronautical Engineering, 2. Space Engineering, 3. Civil Aviation, 4. Virtual Engineering in Aeronautics,

2. has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, necessary for numerically solving boundary problems, inverse problems, optimization, statistical analysis,

3. has a basic knowledge of automation systems, microcontrollers, control algorithms, automation and industrial robots, electronic navigation systems used in machines, and wired and wireless communication systems in local computer networks used in aviation and astronautics,

Skills

1. knows how to use native and international languages to the extent that enables understanding technical texts and writing technical descriptions of machines in the field of aviation and astronautics (technical terminology), using dictionaries,

2. has the ability to self-study using modern teaching tools, such as remote lectures, internet sites and databases, didactic programs, e-books,

3. can obtain information from literature, the Internet, databases and other sources. Is able to integrate the obtained information, interpret and draw conclusions from them and create and justify opinions,

Social competences

1. understands the need to learn throughout life; can inspire and organize the learning process of other people,

2. Is ready to critically evaluate its knowledge and content, recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in the event of difficulties in solving the problem by themselves,

3. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for the decisions made,

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Final test.

Programme content

1. Definition of control and management automation,

2. Automatic flight control systems,

3. Definition of the controller, setting variable and control variable,

4. Diagram and description of the open and closed control system,

5. The system of regulation in a steady state and undetermined state and what conclusions result from it,

6. Types, characteristics of input signals and their equations,

7. Analog-to-digital and digital-to-analog converters,

8. Structure of inertial navigation system, determination of initial orientation,

9. Kinds of elements appearing in the automatic control system with the diagram,

10. Satellite navigation systems,

11. Types of linear elements, functions f (t), transmittances, characteristics, and examples,

12. Parameters for determining the spatial position of moving objects, transformation matrices,

13. Study of static and dynamic properties (static and dynamic characteristics),

14. Executive systems on an aircraft,

15. Tasks of regulators in the automatic control system,

16. Distribution of regulators with description and examples,

17. Characteristics of P, I, PI, PD and PID regulators,

18. Error and dead zone of selected regulators,

19. Time of integration and differentiation time on the example of selected regulators,

20. Power and control systems on board the aircraft.

Teaching methods

Lecture with multimedia presentation.

Bibliography

Basic

1. Winkler W., Wiszniewski A., Automatyka zabezpieczeniowa, Wydawnictwo WNT, Warszawa 2013,

2. Rumatowski K., Podstawy automatyki cz.1, Wydawnictwo Politechniki Poznańskiej 2004,

3. Rumatowski K., Podstawy automatyki cz.2, Wydawnictwo Politechniki Poznańskiej 2004,

4. Urbaniak A., Podstawy automatyki, Wydawnictwo Politechniki Poznańskiej 2001.

Additional

1. Horla D., Podstawy automatyki, Wydawnictwo Politechniki Poznańskiej 2003,

2. Wiak S., Mechatronika cz.2, Wydawnictwo Politechniki Łódzkiej 2010,

3. Schwartz M., Arduino Automatyka domowa dla każdego, Wydawnictwo Helion 2015.

Breakdown of average student's workload

	Hours	ECTS
Total workload	56	2,0
Classes requiring direct contact with the teacher	48	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	19	1,0

[1] delete or add other activities as appropriate