STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Introduction to Control Theory		**101034166uuuwwj0013**
Field of study	Profile of study (general academic, practical)	Year /Semester
Mathematics in Technology	**general academic**	**3 / 6**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Modeling in Technology	**Polish**	**elective**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle of studies (Polish Qualifications Framework level six)	**full-time**	
No. of hours		No. of credits
Lecture: **15** Classes: **15** Laboratory: - Project/seminars: -		2
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
other	**university-wide**	
Education areas and fields of science and art		ECTS distribution (number and %)
Technical sciences		**2 100%**
Technical sciences		**2 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	has a broad and in-depth knowledge of the various branches of higher mathematics and a specific knowledge of the applications of mathematical methods and tools in the technical sciences has a broad and in-depth knowledge of mathematical modelling has structured and theoretically based knowledge in the field of technical sciences, including electrotechnics, electronics and automatics [K_W01(P6S_WG)]; [K_W02(P6S_WG)]; [K_W04(P6S_WG)];
2	**Skills**	is able to use knowledge of higher mathematics is able to build and analyse simple mathematical models is able to select appropriate sources of knowledge and obtain the necessary information from them, and to critically analyse and evaluate solutions to complex and unusual engineering problems [K_U01(P6S_UW)]; [K_U02(P6S_UW)]; [K_U06(P6S_UW)].
3	**Social competencies**	Is aware of its level of knowledge in relation to research carried out in the scientific and technical sciences Is aware of the deepening and broadening of knowledge to solve newly emerging technical problems [K_K01(P6S_KK)], [K_K02(P6S_KK)].

Assumptions and objectives of the course:

To improve theoretical and practical skills related to multi-dimensional system modelling using state space methods.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. has a broad and in-depth knowledge of the various branches of higher mathematics and a detailed knowledge of the application of mathematical methods and tools in the technical sciences

2. has structured and theoretically based knowledge in the field of technical sciences, including electrotechnics, electronics and automation.

[K_W01(P6S_WG)]; [K_W06(P6S_WG)].

Skills:

1. is able to use knowledge of higher mathematics
2. is able to build and analyse simple mathematical models
3. is able to use mathematical tools and methods, including numerical methods, to solve engineering problems

[K_U01(P6S_UW)];[K_U02(P6S_UW)];K_U03(P6S_UW)];

Social competencies:

1. Is aware of its level of knowledge in relation to research carried out in the scientific and technical sciences
2. Is aware of the deepening and broadening of knowledge to solve newly emerging technical problems

[K_K01(P6S_KK)], [K_K02(P6S_KK)].

Assessment methods of study outcomes

Written examination, tests written/oral, projects.

Course description

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Lecture - issues:

1,2. introduction to modelling of systems in the state space

3. introduction to the concepts of controllability and observability,

4,5. stability of systems

6.7. feedback from status and output

Exercises:

1,2,3. modelling of mechanical, electrical and electro-mechanical systems in the state space

4. determination of the controllability and observability of systems,

5. system stability testing

6.7. designing feedback control from the output and from the state

Translated with www.DeepL.com/Translator

Basic bibliography:

1. Tadeusz Kaczorek, Teoria układów regulacji automatycznej, WNT, Warszawa 1977
2. Katsuhiko Ogata, Modern Control Engineering, 5th edition, Pearson, 2010

Additional bibliography:

1. Stefański Tadeusz, Teoria sterowania, T1 Politechnika Świętokrzyska 1991
2. M.W. Spong, M. Fujita*Control in robotics. Report,* T. Samad, A.M. Annaswamy (Eds.), The impact of control technology (2011)

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Classes	15
3. Tutorials	5
4. Preparation to the classes	30

Student's workload

Source of workload	hours	ECTS
Total workload	65	2
Classes requiring direct contact with the teacher	35	1
Practical activities	30	1