Subject programme

1. Subject name / subject module: **Control Theory**
2. Lecture language: **English**
3. The location of the subject in study plans:
   - Area or areas of the studies: **Computer Engineering and Mechatronics**
   - Degree of the studies: **1st degree studies**
   - Ftield or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Repka Michal, dr inż.**
   - People cooperating in the development of the programme of the subject:
5. The number of hours and forms of teaching for individual study system and the evaluation method:

Teaching activities with the tutor																						
Mode of study	Form of classes																					Total
	...	SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				22	28	2																2
Part-time studies																						
Credit rigor				Exam																		

6. Student workload – ECTS credits balance:
   1 ECTS credit corresponds to 25-30 hours of student work needed to achieve the expected learning outcomes including the student's own work

Activity (please specify relevant work for the subject)	**Hourly student workload (full-time studies/part-time studies)**
Participation in lectures	-
Participation in laboratory classes	22
Preparation to laboratory classes	11
Independent study of the subject	7
Preparation of homeworks	6
Participation in an exam / graded assignment	-
Total student workload (TSW)	50
ECTS credits	2
* Student's workload related to trainings	50
Student's workload in classes requiring direct participation of academic teachers	22

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:
   - Recommended admission requirements – none.
   - Recommended duration of the subject is taken from the course plan.
8. Specific learning outcomes – knowledge, skills and social competence:

Specific learning outcomes for the subject		**Form**	**Teaching method**	**Methods for testing of (checking, assessing) learning outcomes**
Outcome symbol	**Outcome description**			
Knowledge				
K_W05	**A student has basic knowledge of control systems and regulators.**	**Laboratory work**	**Inquiry methods**	**Student learning activities**
K_W08	**A student knows and understands selected specific issues in the field of control systems and practical applications of this knowledge.**			
Skills				
K_U08	**A student is able to plan and carry out experiments with regulators, including measurements of basic system characteristics.**	**Laboratory work**	**Inquiry methods**	**Student learning activities**
K_U14	**A student is able to see and identify problems with configuring parameters of basic regulators.**			
K_U15	**A student is able to assess the suitability and choose the appropriate methods tools and materials to create simple control system.**			

9. Assessment rules / criteria for each form of education and individual grades

0% - 50%	ndst	**80% - 86%**	db
51% - 70%	dst	**87% - 93%**	db+
71% - 79%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Lab reports	dst, db, bdb(3,4,5)	arithmetic mean (5,3,4)* 40%	1.6
Homeworks	dst, db, bdb(3,4,)	arithmetic mean (5,3,4) * 10%	0,4
Final exam	bdb (5)	5.0 * 50%	2,0
Final result			4,0
Grade		4,0/5 = 80%	**db (4.0)**

10. The learning contents with the form of the class activities on which they are carried out

(Laboratory work)

1. Introduction to control engineering;
2. System modelling;
3. Time domain analysis;
4. Introduction to closed-loop control systems;
5. Design in the s-plane;
6. Design in the frequency domain;
7. Digital control systems design;
8. State-space methods;
9. Optimal control system design

11. Required teaching aids

a. Lecture - multimedia projector

b. Laboratory classes - specialist laboratory

12. Literature:

a. Basic literature:

1. Golnaraghi F., Kuo Benjamin C.: Automatic control systems, John Wiley & Sons, New York 2010, ISBN: 978-0-470-04896-2
2. Nise Norman S.: Control systems engineering, John Wiley & Sons, Hoboken 2008, ISBN: 978-0-471-79475-2
3. Dorf Richard C., Bishop Robert H.: Modern control systems. Upper Saddle River, 2008, ISBN: 978-0-13245192-5

b. Supplementary literature:

1. Ogata Katsuhiko: Discrete-time control systems. 2nd ed., Upper Saddle River, 1995, ISBN: 0-13-034281-5
2. D.H. Hanssen: Programmable Logic Controllers: A Practical Approach to IEC 61131-3 using CODESYS, Wiley, ISBN: 9781118949214

13. Available educational materials divided into forms of class activities (Author's compilation of didactic materials, e-learning materials, etc.)

14. Teachers implementing particular forms of education:

Form of education	Name and surname
1. Lecture	
2. Laboratory classes	Repka Michal, dr inż.
3. Training	
4. Project classes	
5. Workshop classes	
6. Simulation game	
7. Language classes	