Course code C.10. **Course item** ……

1. INFORMATION ABOUT THE COURSE

A. Basic information

Course title	Control Systems Analysis
Field of study	Computer Aided Engineering
Cycle	*Second*
Study profile	*Academic*
Study mode	*Full-time*
Specialisation	*Not relevant*
Unit responsible for the field of study	*Faculty of Mechanical Engineering*
Lecturer	*Dr hab. inż. Kazimierz Peszyński, prof. nadzw. UTP* *Dr inż. Sylwester Wawrzniak*
Introductory courses	*Fundamentals of Electronics and Electrical Engineering.*
Prerequisites	*Basic knowledge on the use of MATLAB (SCILAB) at the start of the course is an advantage, but not a necessity*

B. Semester/ weekly timetable

Semester	Lectures	Classes	Laboratories	Project classes	Seminars	Field experience	ECTS credits
III	15	-	15	-	-	-	2

LEARNING OUTCOMES (acc. to National Qualifications Framework)

No.	Description of learning outcomes	Reference to learning outcomes for the field of study	Reference to learning outcomes for the area of study
KNOWLEDGE			
K1	The student should be familiar with simulation software for objects and systems	CAE_W04	T2A_W04, T2A_W05
K2	The graduate knows computational methods useful in modeling facilities and technical equipment	CAE_W02	T2A_W03, T2A_W07
SKILLS			
S1	The student can simulate the behavior of the technical facilities and equipment using computer-aided tools, and on this basis can propose improvements to existing structures and systems	CAE_U02	T2A_U09, T2A_U16, T2A_U17
S2	The student should be able to plan and carry out experiments and numerical simulations, interpret the results and draw conclusions	CAE_U12	T2A_U08

SOCIAL COMPETENCES			
SC1	The graduate can adequately define the priorities for implementation specified by his own or other tasks	CAE_K04	T2A_K04

2. TEACHING METHODS

multimedia lecture, laboratory, demonstration, discussion

2. METHODS OF EXAMINATION

Written examination, project and reports.
The reports will be derived through the course. The written exam will be multiple-choice exam. The reports and the exam will evaluated together.

3. COURSE CONTENT

Specify the content separately for each type of classes in accordance with point I.B.	LECTURES: Mathematical modeling of mechanical, electrical, fluid, and thermal systems. Transient and steady-state response analyses. Root locus and frequency analysis. Control systems analysis and design by the root-locus and method. Control systems analysis and design by the frequency-response method. PID controllers and modified PID controllers. Application of standard controllers and compensators. Control systems analysis in state space. The theory and methods reviewed are supported by many practical examples. LABORATORY: Matlab (SCILAB) simulations (step, frequency response of closed loop circuit, stability, modeling of basic mechanical, electrical, fluid, thermal processes and plants)

4. VALIDATION OF LEARNING OUTCOMES

(Each learning outcome from the list requires validation methods to ensure that it was achieved by a student.)

Learning outcome	Form of assessment (for example:)					
	Oral examination	Written examination	Colloquium	Project	Report	……
K1		x				
S1				x		
SC1					x	

5. LITERATURE

Basic literature	1) Ogata K., Modern Control Engineering, Third Edition, Prentice-Hall International, Inc., University of Minnesota 2004 2) Kuo B. C., Golnaraghi F, Automatic Control Systems –, John Wiley & Sons, 2003 3) Spong M.W, Hutchinson S., Vidyasagar M.. Robot Modeling and Control, John Wiley & Sons, Inc 2006
Supplementary literature	1) Houpis, C.H. and Lamont, G.B., Digital Control Systems, McGraw-Hill Book Co. New York, USA 1995 2) Azzo, J.J.D. and C.H. Houpis, Feedback control system analysis and synthesis, McGraw – Hill International, 3rd Edition, 1998.

6. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity	Student workload– number of hours (for example:)
Participation in classes indicated in point 2.2	30
Preparation for classes	10
Reading assignments	10
Other (preparation for exams, tests, carrying out a project etc)	10
Total student workload	60
Number of ECTS credits allocated by the lecturer	**2**
Final number of **ECTS credits (determined by the Programme Council for the Field of Study)**	2