ERASMUS+

EU programme for education, training, youth and sport

Incoming student mobility

Name of UNIOS University Unit: SCHOOL OF APPLIED MATHEMATICS AND INFORMATICS

COURSES OFFERED IN FOREIGN LANGUAGE
FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS

Department or Chair within the UNIOS Unit	School of Applied Mathematics and Informatics

Study program	• Undergraduate university study programme in Mathematics and Computer Science • Undergraduate university study programme in Mathematics

Study level	Undergraduate (Bachelor)

Course title	Introduction to Control Theory with Applications
Course code	M092
Language of instruction	English
Brief course description	Syllabus. 1. Introduction to dynamic systems. Linear time invariant (LTI) system. 2. Control objectives. PID regulator. Implementation of PID regulator in discrete time model. 3. Modelling and understanding control settings: example of differential drive wheel robot. Unicycle model. 4. Linearization of nonlinear models. 5. Asymptotic stability. State feedback (closed loop dynamics). Output feedback. 6. Controllability and regulator synthesis by setting the desired eigenvalues (pole placement). Examples: Segway robot model and its controllability. 7. Observability; The separation principle and regulator synthesis. 8. Introduction to hybrid systems: Hybrid automata. Stability. Zeno behaviour in hybrid systems. Sliding Mode control and regularization.
Form of teaching	Consultative teaching.

Form of assessment	Classes are organized through lectures and exercises. During lectures students will be familiarized with basic and important terms and results in control theory. During exercises students apply the acquired abstract knowledge to the concrete problems in mobile robot control via MATLAB or Python based simulator, as well as implement the theory on a real mobile robot (Raspberry Pi) constructed by the students. Lectures and exercises are obligatory. Exam will consist of a practical work (project) through which the student has to demonstrate theoretical and practical skills learned. Homework and seminar papers made during the semester will influence the final grade.
Number of ECTS	7
Class hours per week	2+2+1
Minimum number of students	
Period of realization	Summer semester
Lecturer	Zoran Tomljanović