ANALOG AND DIGITAL AUTOMATIC CONTROL

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Electronic Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0806.4.005.0	**SEMESTER**	2nd
COURSE TITLE	Analog and Digital Automatic Control		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	5	5
Total	**5**	**5**

COURSE TYPE general background, special background, specialised general knowledge, skills development	
PREREQUISITE COURSES	Mathematics, Physics I, Signals and Systems
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek or English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The purpose of the course is for students to acquire the theoretical and practical background in Automatic Control Systems (ACS) in both continuous and discrete time and their applications. The course aims to introduce students to the fundamental concepts of Automatic Control Systems. The course covers the following thematic areas: (a) Description of continuous-time systems in the form of transfer functions, (b) Analysis of transfer functions: Calculation of characteristic system metrics in the time and frequency domains, (c) Design of closed-loop systems PID controllers, (d) Design of closed-loop control systems using the Ziegler-Nichols empirical method, (e) Analytical design of closed-loop control systems using the pole placement method: Design in continuous and discrete time, (f) Calculation of steady-state errors and system type for closed-loop systems.
The course is accompanied by laboratory-type applications via the MATLAB and Simulink simulation environments.
Learning Outcomes:
Upon completion of the course, students should be able to utilize the acquired knowledge to: (a) Analyze and study the behavior of a linear dynamic system, (b) Design controllers and study their impact and performance on the response behavior of the closed-loop system.

General Competences

Decision-making
Teamwork (or *Group work*)
Oral presentation of group work
Criticism and self-criticism
Promotion of free, creative and inductive thinking

3. SYLLABUS
Representation of dynamic systems with transfer functions System analysis in the time and frequency domains Stability analysis Block diagram algebra Closed-loop control systems PID controllers Control System Design using the Ziegler-Nichols method Simulation of closed-loop control systems Control SystemDesign using the pole placement method Calculation of steady-state errors Closed-loop control system type

<table>
<tr><th colspan="2">4. TEACHING and LEARNING METHODS - EVALUATION</th></tr>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Oral presentations</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>MS Power point, e-class, Matlab, Simulink, LaTeX,</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Groups of theoretical exercises, Groups of Laboratory Exercises, Mid-Term, test, Final Test</td><td>150</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>150</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure</td><td>Mid-term test, Final test, Groups of theoretical and laboratory exercises.</td></tr>
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5. ATTACHED BIBLIOGRAPHY
Benjamin Cuo and Farid Golnaraghi, Automatic Control Systems, John Wiley, 8th Edition, 2003.