COURSE DESCRIPTION − ACADEMIC YEAR 2023/2024

Course title	**Fundamentals of Systems and Control**
Course code	42411
Scientific sector	ING-INF/04
Degree	Bachelor in Electronics and Cyber-physical Systems (L-8)
Semester	1
Year	2
Credits	6
Modular	No

Total lecturing hours	36
Total exercise hours	24
Attendance	Attendance at lectures is strongly recommended. Attendance at exercise sessions is required.
Prerequisites	Mathematical Analysis I and II; Physics I and II; Basics of Electronics; Fundamentals of Programming (Module 1)
Course page	Teams Channel

Specific educational objectives	The course belongs to the type "caratterizzanti - ingegneria elettronica". The course introduces the fundamentals of linear control theory. Topics covered include: The dynamic response of 1st and 2nd order systems; linear stability; root locus stability analysis; control design and stability analysis in the frequency domain; and time-permitting, basics of digital control systems. The course is aimed at $1^{st}/2^{nd}$ year undergraduate level students and focuses on building understanding and intuition. Examples and exercises that use Matlab and Simulink will be given.

Lecturer	Prof. Karl von Ellenrieder Web : https://www.unibz.it/faculties/person/37038-karl-dietrich-von-ellenrieder
Contact	Facoltà di Igegneria, Building L, Room 6.02 Tel.: +39 0471 017172 E-mail: karl.vonellenrieder@unibz.it
Scientific sector of lecturer	ING-INF/04 – Automatica (Systems and Control Engineering)
Teaching language	English
Office hours	As listed on Teams or by appointment
Teaching assistant (if any)	Dr. Seyed Mohsen Hosseini Web : https://www.unibz.it/it/faculties/engineering/academic-staff/person/46594-seyed-mohsen-hosseini
Contact TA	NOI Techpark, Building A1, Room A1.4.29b Tel.: +39 0471 017899 E-mail: seyedmohsen.hosseini@unibz.it
Office hours TA	As listed on Teams or by appointment

List of topics	The course covers the following topics:
	 1. Introduction
	      a. Time response of $1^{st}/2^{nd}$ order systems
	      b. Block diagrams

	c. Linear stability
	d. Effects of feedback
	2. Classical Control
	    a. root locus – fundamental ideas
	    b. frequency methods – fundamental ideas and design approach
	3. Basics of Digital Control (time-permitting)

Teaching format	Classroom lectures and in-class exercises

Learning outcomes	To be defined

Assessment	**Formative assessment**

Form	Length /duration	ILOs assessed
Exercises	24 hours total	

Summative assessment

Form	%	Length /duration	ILOs assessed
Exercises	30		
Final Exam	70	4 hours	

Assessment language	English
Assessment Typology	Monocratic
Evaluation criteria and criteria for awarding marks	In-Class Exercises: Completeness and correctness of answers; level of understanding Written Final Exam: Completeness and correctness of answers. Students are required to receive an overall grade of greater than 60/100 points (final mark of 18/30) to pass the course.

Required readings	Lecture notes and exercises will be available on Teams. Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it and Ilaria Miceli, Ilaria.Miceli@unibz.it
Supplementary readings	Additional books and articles may be recommended by the instructor during the course.
Software used	Matlab and Simulink.