Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Automatic Control
Course code	47511
Scientific sector	ING-INF/04
Degree	Master in Industrial Mechanical Engineering
Semester	1
Year	*I*
Academic year	2017/18
Credits	5
Modular	*no*

Total lecturing hours	28 hrs
Total lab hours	
Total exercise hours	20 hrs
Attendance	Recommended
Prerequisites	none
Course page	http://www.unibz.it/en/sciencetechnology/progs/master/industrial-and-mechanical-engineering/default.html

Specific educational objectives	The course provides an introduction to the fundamentals of control theory, at an introductory/ intermediate level. Topics covered include classical and nonlinear control techniques: Laplace Transform, Root Locus, Frequency Design Methods and State Space Techniques. Time permitting, aspects of nonlinear control, such as Lyapunov Stability, feedback linearization and back-stepping, will be presented. The course is aimed at beginning graduate students and focuses on building understanding and intuition. Examples and exercises that use Matlab and Simulink will be given.

Lecturer	Prof. Karl von Ellenrieder Facoltà di Scienze e Tecnologie Building K, Room 2.08 Tel.: +39 0471 017172 E-mail: karl.vonellenrieder@unibz.it Web: https://next.unibz.it/en/faculties/sciencetechnology/academic-staff/person/37038-karl-dietrich-von-ellenrieder
Scientific sector of the lecturer	ING-INF/04 - Automatica
Teaching language	English
Office hours	By Appointment
Teaching assistant	To Be Determined

List of topics covered	The course covers the following topics: 1. Introduction a. Dynamical Modeling, Block Diagrams b. Stability c. Effects of feedback on stability **Linear Methods** 2. Classical Control a. root locus – fundamental ideas and design approach b. frequency methods – fundamental ideas and design approach 3. State Space Control **Nonlinear Methods (time permitting)** 4. Lyapunov Stability 5. Feedback and Input Linearization
Teaching format	Classroom lectures and exercises

Learning outcomes	**Knowledge and understanding:** At the end of the course, students will understand: • basic feedback principles • feedback loop requirements for improving system steady state response • conditions that guarantee closed loop system stability • how to design simple controllers via Root Locus and Bode techniques • how to sketch the static feedback root locus and determine the location of the closed-loop poles • (time-permitting) into nonlinear control design, including Lyapunov-based control, input-output linearization and backstepping • how to present and analyze a control system **Applying knowledge and understanding:** through exercises that complement the lectures. **Making judgments:** on the choice of analytical and numerical tools **Communication skills:** presenting and discussing solutions to selected exercises **Learning skills:** basic foundations of automatic control

Assessment	Written Final Exam
Assessment language	English
Evaluation criteria and criteria for awarding marks	Criteria for the evaluation of the written exam: completeness and correctness of answers. Students are required to receive an overall grade of greater than 60/100 points in order to pass the course.

Required readings	Lecture notes and exercises will be available on the UniBZ Open Learning Environment (OLE)
Supplementary readings	Additional books and articles may be recommended by the instructor during the course.