Obuda University John von Neumann Faculty of Informatics		Institute of Biomatics		
Name and code: *Systems and control theory (NBXRI1EMNE)* **Credits*: 6*** *Computer Engineering MSc* *2022/23 year I. semester*				
Subject lecturers: Prof. Dr. Levente Kovács, Johanna Sájevicsné Dr. Sápi				
Prerequisites (with code):				
Weekly hours:	Lecture: 2	Seminar.: 0	Lab. hours: 2	Consultation: 0
Way of assessment:	Homework and fina exam			

Course description:

Goal: The aim of the lecture is to introduce basic concepts in the domain of system theory.

Course description: Throughout the semester, the course will cover the basic concepts of systems and control theory, with an emphasis on the implementation of theoretical methods on the computer. Students will learn about difference equations, which will help them to master the basic properties of differential equations. Students will be introduced to both modern and classical descriptions of systems, which will be used to learn about various control strategies.

Lecture schedule

Education week	*Topic*
1.	Introductory lecture, basic mathematical concepts
2.	Difference equations and simple models
3.	Simulation of differential equations
4.	Equilibrium points, stability
5.	Linearization of nonlinear systems
6.	Linear control strategies
7.	State feedback, observability, controllability
8.	State observers and LQR control
9.	Fourier- and Laplace transforms, transfer functions
10.	Design of PID controllers I.
11.	Design of PID controllers II.
12.	Model Predictive Control I.
13.	Model Predictive Control II.
14.	Summary and Consultation

Midterm requirements

Student participation in the lectures and labs is required.
One homework assignment will be given during the semester, which must be solved independently by the given deadline and the solution must be documented. The homework will be given to the students in week 8 and they will have two weeks to solve the assigned assignment.
Signature requirement: submission of the homework before the deadline and a grade of at least satisfactory

Final grade calculation methods

Final grade = 0.5*theoretical test + 0.5*practice exam
A minimum of 50% must be achieved in each part.

Type of exam

1.theoretical exam - only those who have signed the application form may sit the theoretical examination 2. practical examination - only those who have passed the theoretical examination may sit the practical examination - if you fail the practical test, you only have to make up the practical part, you do not have to retake the theory test - is done by computer
Type of replacement
According to the Neptun system.
References
Obligatory: Lecture notes (download form https://elearning.uni-obuda.hu/)
Recommended: - Karl J. Åström and Richard M. Murray: Feedback Systems: An Introduction for Scientists and Engineers -