Obuda University John von Neumann Faculty of Informatics			Institute of Biomatics and Applied Artificial Intelligence	
Name and code: *Control theory in Robotics, NBIRI2SMNE* **Credits*: 3*** *2022/23 year II. semester*				
Subject lecturers: Dr. Drexler Dániel András				
Prerequisites (with code):				
Weekly hours:	Lecture: 1	Seminar.: 0	Lab. hours: 1	Consultation: 0
Way of assessment:	midterm test.			
Course description:				
Goal: Students become familiar with the basics of nonlinear control and dynamic control of robots described as series of kinematic chains.				
Course description: Linear and nonlinear systems, equilibrium points, linearization techniques, path tracking control, reference path generation, stability analysis (Lyapunov methods), states space control, control of robot arms with velocity and torque input.				

Lecture schedule	
Education week	*Topic*
1.	Introduction, linear and nonlinear systems.
2.	Equilibrium points of nonlinear systems, linearization in an operation point.
3.	Exact linearization of nonlinear systems.
4.	Path tracking control, reference path generation.
5.	Examples.
6.	Stability of equilibrium points, stability definitions, examples.
7.	Stability of equilibrium points, Lyapunov's 1st method, examples.
8.	Stability of equilibrium points, Lyapunov's 2nd method, examples.
9.	Examples.
10.	State space control of linear systems.
11.	State space control, state estimation.
12.	Control of robotic arms with velocity input and torque input.
13.	Midterm test.
14.	Midterm test replacement.
Midterm requirements	
One midterm test.	

2023. 02. 07.

Final grade calculation methods

Achieved result	Grade
89%-100%	excellent (5)
76%-88<%	good (4)
63%-75<%	average (3)
51%-62<%	satisfactory (2)
0%-50<%	failed (1)

Type of exam

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Type of replacement

According to the neptun system.

References

Obligatory: lecture notes from elearning.uni-obuda.hu

Recommended:

Richard M. Murray, Zexiang Li, S. Shankar Sastry, *A Mathematical Introduction to Robotic Manipulation*, CRC Press, Inc. Boca Raton, FL, USA 1994

Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, *Robotics: Modelling, Planning and Control*, Springer Publishing Company, Incorporated 2008

Kevin M. Lynch and Frank C. Park, *Modern robotics: Mechanics, Planning, and Control*, Cambridge University Press, 2017