Obuda University John von Neumann Faculty of Informatics	*Institute of Biomatics and Applied Artificial Intelligence*

Name and code: *Computer Science Engineering MSc*			**Credits*: 0***	 *2021/22 year I. semester*
Responsible person of subject: Dr. György Eigner				
Subject lecturers: Dr. György Eigner				
Prerequisites (with code):	NMXAN2EBNE Calculus II			
Weekly hours:	Lecture: 2	Seminar.: 1	Lab. hours: 0	Consultation: 0
Way of assessment (exam or midterm grade):	Exam			

Course description:

Goal: The students will become familiar with the foundations of system theory. The subject focuses on the description and analysis of linear dynamic systems. It provides an overview about the description of the linear dynamic systems in the time domain, frequency domain and complex frequency domain, investigates the connection between these domains and their applications. Thorough the subject the basic techniques for system analysis are investigated which can be applied to examine the steady state and stability of the system, effect of the transients, connections between the components of the system and countereffects between them. In the second part of the subject the discrete systems and their analysis in the time domain and in the frequency domain are analyzed. The students become familiar with the foundations of sampling and its applications. During the semester, the students will have enough knowledge to analyze dynamical systems independently and get a solid basis to control engineering. The theoretical and practical knowledge of the students are strengthened by using appropriate examples as illustration.

Course description: Introduction, mathematical foundations, differential equations, steady states, stability, frequency domain based description, characteristic functions, Bode-diagram, Nyquist-diagram, connectivity of systems, stability of the closed loop, Laplace-transformation, transfer function, basic terms, discrete systems, difference equations, fixed points, sampling, Shannon's theorem, z-transformation.

Lecture schedule

Remark: there can be difference in the selected topics due to we plan to do demonstrations beyond the topics appear here.

Education week	*Topic*
1.	Introductory lecture
2.	Continuous time linear systems in the time domain and differential equations
3.	Steady state and stability (time domain)
4.	Frequency based description (Fourier transformation, characteristic function)
5.	Bode and Nyquist diagram
6.	System description in the frequency domain, connections of systems
7.	Analysis of stability in frequency domain (Bode- and Nyquist-stability)
8.	Laplace-transformation, transfer function
9.	Description of basic terms
10.	Test

11.	Discrete system descriptions in the time domain, difference equations, fixed points
12.	Sampling, Shannon's theorem
13.	Z-transformation
14.	Replacement test

Midterm requirements

Student participation in the lectures and labs is required.
The written test should be performed at least satisfactory grade
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Assessments schedule

Education week	*Topic*

Final grade calculation methods

13. Test

14. Replacement test

A minimum of 50% must be achieved from one of the tests.

Maximum 50 points can be achieved. The evaluation is based on the following table:

Results	Grade
45-50	excellent (5)
38-44	good (4)
32-37	average (3)
26-31	satisfactory (2)
0-25	failed (1)

Remark: the points can be different in the Test, however, the ratios of evaluation is the same.

Type of exam

Written.

Type of replacement

Replacement test on the last week. Replacement test on the first week of the exam period.

References

Obligatory: Lecture notes + book recommendations.

Recommended: -