Obuda University John von Neumann Faculty of Informatics			Institute of Applied Informatics	
Name and code: *Control Engineering* (NIRCE1SERD) **Credits*: 3***				
Science Without Borders program (for Brazilian students) *2014/15 year I. semester*				
Subject instructors: Dr. Levente Kovács, Johanna Sájevicsné Sápi				
Prerequisites (with code):				
Weekly hours:	Lecture: 2	Seminar.: 0	Lab. hours: 2	Consultation: 0
Way of assessment:	Practice exam & theoretical test			

Course description:

Goal: The aim of the lecture is to familiarize students with basic linear control theory notions.

Course description: Open vs closed loop systems, linear time-invariant continuous systems. Modeling, ex. linear electrical, mechanical systems. Laplace transform. Transfer function. First and second order systems. Steady state error, pole-zero location, stability. Frequency Domain Analysis. Bode plots, stability and loop transfer function. Series compensations. Zigler-Nichols-, Kessler methods, PID control. State-feedback control. LQ control.

Lecture schedule

Education week	*Topic*
1.	Introduction and examples of biomedical applications (10.09.2014)
2.	Basics of Control Theory I. (17.09.2014)
3.	Basics of Control Theory II. (24.09.2014)
4.	Matlab exercise (01.10.2014)
5.	Stability criteria; Step response, steady state; Controllability, Observability (08.10.2014)
6.	Empirical Tuning of PID Controllers (15.10.2014)
7.	PID controller design I. (22.10.2014)
8.	PID controller design II. (29.10.2014)
9.	PID controller design III. (05.11.2014)
10.	State Feedback Control – Controller design in state space I. (12.11.2014)
11.	Holiday (19.11.2014)
12.	LQ control, Linear Quadratic Regulator (LQR) – Controller design in state space II. (26.11.2014)
13.	Exam (03.12.2014)
14.	Replacement exam

Homework schedule

Education week	*Topic*
5.	Homework I
9.	Homework II
12.	Homework III

Midterm requirements

Student participation in the classroom is required.
All three homeworks are required to complete during the midterm.

Final grade calculation methods

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

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

Type of exam

Practice exam & theoretical test

Type of replacement

In the 14th week, both for practice exam & theoretical test.

References

Obligatory: Lecture notes (download form https://elearning.uni-obuda.hu/)

Recommended:
Bronzino J.D: The Biomedical Engineering Handbook. CRC Press, 2005.
Khoo M: Physiological Control System. Analysis, Simulation and Estimation. IEEE Press, 2000.

Other materials: -