Course Outline (*please complete as appropriate*)

COURSE TITLE	Automatic Control
NAME OF LECTURER	Bálint Kiss

COURSE DESCRIPTION

The control of technological, economical, and environmental processes belongs to the electrical engineers' most important professional activities. The course teaches the fundamentals of control engineering, the main principles of analysis and synthesis of control loops, and the use of the related technical computing tools. Students successfully satisfying the course requirements are prepared to analyze continuous time control loops, to design different types of compensators, and to later engage courses in more advanced fields in control theory. A wide range of application examples are presented from the field of automotive industry, intelligent building control, and process industry.

RECOMMENDED READINGS

G.F. Franklin & J.D. Powel "Feedback Control of Dynamic Systems (5th Ed.)", Prentice Hall, 2006.

R.C. Dorf "Modern Control Systems (10th Ed.)", Addison-Wesley, 2004. or any similar standard textbook

TEACHING METHODS

Interactive teaching methods are preferred, for example: lectures using PPT, PBL, Case Studies, Class and Group Discussions, Student Presentations etc. This gives the occasion to students to practice their English and communication skills.

Approximately 40 of the classes will be preferably held in computer rooms using Matlab.

ASSESSMENT METHODS

The final grade is a weighted sum of the following items: mid-term 25, written exam (last day) 40, homework assignments 25, in-class tests and quizzes (thee or or four times) 10.

CLASS TOPICS *(each class is 3 hrs)*

Class 1: Introduction, basic definition (control loop, feedback, applications, history)

Class 2: Classification of control systems, specification of performance

Class 3: Plant models, modeling methods

Class 4: Analysis of control loops in steady state (reference tracking and disturbance rejection)

1st homework assignment

Class 5: Transient responses, li nks between the Laplace domain and time domain desc riptions, stability of control loops

Class 6: Stability criteria (Nyquist and Bode) and their applications

Class 7: Compensator types, pole and zero injection

Mid-term Exam

Class 8: Root locus ba sed analysis of control loops

Class 9: Compensator design techniques for the family of PI, PD, PID regulators

Class 10: Compensator design techniques for the family of PI, PD, PID regulators

Class 11: Implementation tools for regulators

2nd homework assignment

Class 12: Applications, case studies

Class 13: State-space analysis of control loop – controllability and observability, canonical realizations

Class 14: State-space design methods – state feedback and state observer

Class 15: Issues in discrete time realization of controller, outreach to selected advanced topics

Final Exam

SPECIAL COMMENTS

Prerequisites: linear differential equations, Laplace transform, elementary complex algebra and analysis (the most important results will be summarized at the beginning of the session).

해외우수교수초빙강좌 수강 제한 및 유의사항 (Notice for KNU students)

a. 2018년 8월 졸업예정자(조기졸업자 포함)

b. 국내 타대학 교류학생

c. 재이수의 경우 개강 전 수강취소만 가능(7.4-7.5에 한함)

d. 해외우수교수초빙강좌 수강과목은 2018.2학기 수강꾸러미로 신청불가