General Information:

Name of Course: # SYSTEM THEORY 2.

Course Code: PMTMINB314HA
Semester: 4st
Number of Credits: 5
Allotment of Hours per Week: 2 lectures, 2 practices
Evaluation: Exam (with grade)
Prerequisites: **SYSTEM THEORY 1.**

Instructors: **Dr Ildikó JANCSKÁRNÉ ANWEILER, associate professor**
Office: 7624 Hungary, Pécs, Boszorkány u. 2. Office Nº B106
E-mail: jancskarne.ildiko@mik.pte.hu
Office Phone: +36 72 503650/23912
Dr Zoltán SÁRI, associate professor
Office: 7624 Hungary, Pécs, Boszorkány u. 2. Office Nº B
E-mail:
Office Phone: +36 72 503650/

Course aims
The course provides the students with the fundamental concepts of control engineering including the operating principles of control systems, their analysis and synthesis. The student successfully completing the course will be able to analyze continuous control systems in various engineering applications, to understand and solve the most common control problems in real-time embedded environment. The course provides sufficient background for later specialized studies.

General Course Description and Main Content:
The principles of control, feedback control and open loop control. Analysis of linear control systems: in time- frequency- and operator-domain. Disturbance rejection and command-tracking. Stability analyses. Performances of control systems. Synthesis of continuous time control systems: closed control loop, loop gain, type number. PID controller. Controller parameter design for prescribed steady-state accuracy and phase margin. Control of dead time systems. Robustness investigation of control systems, sensitivity functions. Saturation handling. Control performance enhancements: feedforward-feedback control and cascade control.

Methodology:
Lecturing using NI ELVIS QUANSER models, LabVIEW control loop simulation examples. power point presentations.

System theory 2. **Course Syllabus**
Course Code: IVB353AN Time: L Tuesday 13:15-14:45
Semester: Spring 2018/2019 2. P Tuesday 15:00-16:30
Location: PTE MIK,L A-218, P A117

Schedule:
Study period in 15 weeks: 4. febr. – 18.may. (2019)

1. Introduction, P&ID diagrams. Block diagram, control examples.
2. Elements of the control loop. Step response based system model approximations.
3. Control system design requirements and specification. The Nyquist stability criterion.
4. On/off control. PID controller 1.
5. PID controller 2. The saturation of the final control element.
6. PID controller 3. The type number of the control systems.
7. PID controller4.
8. Control systems with dead time. Midtime exam.
9. Tuning methods of the PID controller
10. Spring break
11. Loop shaping method, Lambda tuning method.
12. Improvements of the single-loop control performance
13. Cascade control and feed forward - feedback control
14. Exam.
15. Exam.

Attendance:
Attending is required all classes. Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Evaluation + Grading
Grading:

1. .Midtime exams result: min 40%.
2. Written exam in the exam period. A minimum of 40% is required to pass the exam.

Grading scale for exam

Numeric Grade:	5	4	3	2	1
Evaluation in points:	86%-100%	71%-85%	56%-70%	40%-55%	0-39%

Students with special needs:
Students with special physical needs and requiring special assistance must first register with the Dean of the Students Office. All reasonable requests to provide an equal learning environment for all students is to be assured.

Required Reading and other Materials will be equivalent to:

- Jancskárné Anweiler Ildikó, *Control engineering*, Pécs: PTE Műszaki Kar, 2016. 148 p.
- Nise, *Control system engineering*. Wiley, 2011
- R. C. Dorf, R. H. Bishop, *Modern control systems*, 12.ed. Prentice Hall, 2011.

Additional papers for reading will be uploaded into Neptun by the instructor.