ESE 315. Control System Design

Fall 2016.

Location: TBA (M, W, 4.00-5:20 PM)

Office hours: Suffolk Hall (South Campus), Room 121 (TU, TH, 12.00-1.30 PM)

Aims and scope: Control components, development of block diagrams for control systems, analysis and computer simulation. Design of control systems: root-locus and frequency response methods. Introduction to digital control systems.

Text: Norman S. Nise, *Control Systems Engineering (7th edition)* Wiley, 2015. The previous 6th edition can also be used.

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Homework: Homework problems will be assigned weekly. Solutions will be posted on the blackboard. Examination problems will be based on material used in the homework assignments.

Computer simulations: Simulation of control systems using MATLAB and SIMULINK will be discussed.

Examinations: Four tests: three midterm tests and the final examination.

Grading: Each test accounts for 20% of the final grade. Homeworks account for 20% of the grade.

Syllabus:

1. Introduction. Control components and block diagrams. (Chapter 1)
2. Mathematical preliminaries. Laplace transform. Solving differential equations. (Chapter 2)
3. Analysis in frequency domain. Transfer functions. (Chapter 2)
4. Time response. First and second-order systems. (Chapter 4)
5. Reduction of multiple subsystems. (Chapter 5)
6. Stability. Routh-Hurwitz criterion. (Chapter 6)
7. Steady-state error. (Chapter 7)
8. Root locus method for design of control systems. (Chapter 8, 9)
9. Frequency response method. (Chapter 10, 11)
10. Digital control systems. (Chapter 13. The scope of coverage depends on available time)

If you have any conditions, such as physical or mental disability, which will make it difficult for you to carry out the work as outlined above, please notify me in the first two weeks so that appropriate arrangements could be made.