MIDDLE EAST TECHNICAL UNIVERSITY  
DEPARTMENT OF MECHANICAL ENGINEERING  
ME 304 CONTROL SYSTEMS  
SPRING 2014

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Lecture Hours
S 01  Monday  09:40-10:30  @G-101  Wednesday  09:40-11:30  @G-101
S 02  Monday  15:40-17:30  @G-101  Wednesday  13:40-14:30  @G-101
S 03  Tuesday  15:40-16:30  @B-101  Thursday  09:40-11:30  @B-101
S 04  Tuesday  16:40-17:30  @B-101  Thursday  14:40-16:30  @B-101

Textbook

References
There are a large number of books on control systems in the university library. They all may be useful to you. A selection of the recent books are listed below.


Grading
Midterm Exams 27.5% each, Final Exam 35%, Homeworks 10%

Examinations
Official dates of midterm and final examinations will be announced by the Department. The use of calculators is allowed but not palm or laptop computers. Make-up examinations may be given to those who have valid excuses, which are approved by the department. If you believe that you are entitled to take a make-up examination, you must contact with the course instructor within one week following the regular examination date. Do not be surprised if you find comparatively harder questions in the make-up examinations.

Web Site
The course website can be reached on http://www.me.metu.edu.tr/courses/me304/. Please check in regularly for announcements and lecture materials.

Attendance
You are expected to attend all the class meetings. The basics concepts, key points, applications, methods, sample problems, important explanations and announcements will all be covered by the course instructors during the regular class hours.
Homework

Homework problems will be assigned regularly. Absolutely, no extensions will be granted for the due dates of the collected assignments. Even though team-work efforts are encouraged, they must not go beyond discussions on the solution methods used and/or cross-checking the results of your number-crunching. Every homework solution that you will be handing in should fully and correctly reflect your own personal approaches and efforts in it. You will have to face with all consequences of handing in solutions, which are duplicates of others.

In your homework solutions, if you use sources other than your lecture notes, they should be properly referenced. When you need to use MATLAB, you must supply all the input/output evidences in printed form.

You may use MATLAB in Computer Labs (B-206, B-207) in B-Building of our department at some allocated times (TBA) when there is a MATLAB assignment. During this time interval, there will be assistants available in these laboratories to help you on the use of MATLAB. Please check with MATLAB tutorials posted on the course web page as well.

You should indicate all the necessary explanations and details (such as free-body diagrams) clearly in your solutions.

Neatness will be graded.

All homeworks should be submitted in stapled form. You are expected to prepare your homeworks using the format given in the Homework Format.

Ethics

Students are expected to meet and exceed the highest ethical standards. Any form of unethical behavior such as plagiarizing and signing an attendance sheet in the name of another person will have severe consequences. Disciplinary action will be taken for students displaying unethical behavior.

Course Outline

Introduction and Basic Concepts
Transfer Functions and Block Diagrams
Modeling Physical Systems
Basic Features of Control Systems
Basic Control Actions and Electronic Controllers
Time Response
Stability
Steady State Response and Error
Transient Response
Frequency Response

COURSE OBJECTIVES

• Students will be able to model a physical system and express its internal dynamics and input-output relationships by means of block diagrams and transfer functions.
• Students will know the basic control architectures (OL, FB, FB+FF) and also know how to generate and why to use the basic FB control actions (P, PD, PI, PID).
• Students will know the relationships between the parameters of a control system and its stability, accuracy, transient behavior, tracking ability, disturbance rejection ability, and parameter sensitivity.
• Students will know how to determine the control parameters for low-order systems in a compromising way under the time response requirements of accuracy, relative stability, and speed of response.
• Students will be able to determine the frequency response of a control system and use it to evaluate or adjust the relative stability, speed of response, tracking accuracy, and noise rejection ability of the system by means of the Bode plots of amplitude ratio and phase angle variations.