

MIM U555 System Analysis & Control, Fall 2008

Course description

Presents the theoretical backgrounds for the analysis and design of simple feedback control systems, differential equations, and Laplace transforms. Treats system modeling, linear approximations, transfer functions, and block diagrams; transient and frequency response and stability-frequency domain and root locus methods. Other topics may include linear systems with time lag and relay servomechanisms with small nonlinearities.

Instructor information & office hours

Rifat Sipahi, 321 Snell Engineering Center, Phone: 617-373-6011. rifat@coe.neu.edu
Mon. 4 – 6, Thu. 3 – 5, or email for quick questions.

TA information & office hours

Wed 11.30-1 & Fri 2.30-4.30, TA's office is at #53 Richards Hall. Email: faegh.s@neu.edu

Communication

Communication between instructor and students is essential. Students *should* monitor **Blackboard** for all sorts of announcements and periodically check their email accounts associated with Blackboard. <https://blackboard.neu.edu/>

Prerequisites

MIM U455. Students are expected to be able to use MATLAB
(*Please make sure your COE accounts are functioning properly*)

Textbooks

Richard C. Dorf & Robert H. Bishop, *Modern Control Systems*, 11th edition, Pearson, Prentice Hall, New Jersey. ISBN-13: 978-0-13-600152-2, ISBN-10: 0-13-600152-1

Note that the publisher also offers an e-book version, which is less expensive. Please check with the publisher. Notice also that the ISBN number for the e-book is likely to be different.

(Alternative references are available upon request)

Course objectives

1. Comprehension of the notions of negative feedback control,
2. Building block diagrams, managing block diagram algebra and extracting transfer functions,
3. Characterizing stability / instability, and determining stability robustness measure,
4. Analysis of frequency response and root locus on transfer functions. Interpreting the results linked with real life,
5. Synthesizing feedback control laws for fundamental engineering problems.

Topics to be covered

Uploaded in *Blackboard*.

Assessment tools The students' understanding of the material is assessed through *graded homework, non-graded indicator questions (IQ)* and *graded exams*. Students are *responsible* for following the due dates (listed on course schedule).

1. Please return homework (HW) assignments (there are 5) **on time** (will be announced/posted on Blackboard). Late HW submissions are *not allowed*. TA will read the HW. Any question regarding HW can be directed, during office hours *if possible*, to either the TA or the instructor.
2. A **project** will be assigned and it will be gradually developed by the students during the semester (*Project teams may be created*). Due on **December 10th, 2008 at 6 PM**.
3. There are 5 exams of **indicator questions (IQ)** as shown on the course schedule. These exams are closed book and **minimum 80% success** is required as a **necessary condition, but not sufficient**, for passing the class. In case a student fails an IQ exam, the instructor will schedule another one with the student. Students may re-take IQ exams (those they failed) **until 6 PM on December 10th, 2008** to secure the minimum 80% success requirement (please schedule with the instructor).

Note that IQ exams are made to establish the minimum level of competency.

4. There are **2 midterm exams** and a **final exam** (see course schedule). Any questions regarding these exams should be directed to the instructor. Details will be announced at appropriate times. *Check regularly at Blackboard.*

Ethical behavior

1. Homework assignments are an important tool for active learning and they also strengthen the knowledge of the students. Furthermore, these assignments create discussion platform among the students and they enhance the interaction between the instructor and the students. Students may prefer to discuss with each other when solving homework problems, *however, every student should submit his/her own work.*
2. During exams and IQ exams, no discussion among students is allowed. Students may ask questions to the instructor for clarification purposes.
3. In the process of *assessment tools*, cheating and plagiarism will not be tolerated, and will be handled in accordance with University policies described in the Student Handbook.

Special accommodations

If you have specific physical, psychiatric, or learning disabilities that you believe may require accommodations for this course, please meet with me after class to see appropriate adaptations and/or modifications, which might be helpful for you. The Disability Resource Center (DRC), which is located on campus in 20 Dodge Hall (x 2675) can provide you with information and other assistance to help manage any challenges that may affect your performance in your coursework.

Grading policy

1. To pass the course, it is **necessary, but not sufficient**, that 80% success on IQ exams is achieved.
2. Distribution of assignments:

5 Homework assignments	15%
Project	15%
Midterm 1	20%
Midterm 2	20%
Final	30%
Total	100%