EE 250A (Control System Analysis) - Spring 2018

DEPARTMENT OF ELECTRICAL ENGINEERING, IIT KANPUR

Instructor

Name Dr. Ramprasad Potluri.

Office Hours Primarily by appointment through e-mail or phone. Also, if you find me in my office, please ask me if it is convenient for me to meet with you. We may be able to meet immediately.

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Tutors

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Prof. Pradeep Sircar	(sircar@iitk@...)
Dr. Nishchal Verma	(nishchal@iitk...)
Dr. Ramprasad Potluri	(potluri@iitk...)

Teaching Assistants

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Course meeting

Lecture TThF 11:00-12:00, L1.

Tutorial W 11:00-12:00, T103 – T106.

Course Web page BRIHASPATI. (For announcements of tutorial problems, lecture notes, quiz/exam solutions, marks, etc).

References

As the subject of this course matured by the 1950's, many good books are available in the Indian market. Some are listed below (editions are as of 2013):

Control Systems — Principles and Design, 3rd ed., Madan Gopal, Tata McGraw-Hill, 2008.

Feedback Control of Dynamic Systems, 5th ed., Gene Franklin, J. David Powell, Abbas Emami-Naeini, Pearson Education, 2006.

Modern Control Engineering, 4th ed., K. Ogata, Prentice Hall, 2002.

Automatic Control Systems, 8th ed., B.C. Kuo & F. Golnaraghi, John Wiley & Sons (Asia), 2003.

Modern Control Systems, 8th ed., R.C. Dorf & R.H. Bishop, Addison Wesley Longman Inc., USA, 1998

Notes

The lectures are based on my notes, which I will post periodically on Brihaspati.

My notes adapt from the above-listed books and other sources the minimum set of topics that I have found necessary to design a control system based on a 38 – 42-hour lecture course.

Practice components

Tutorials Each tutorial assignment will contain about 5 – 10 problems. Each tutorial assignment will be posted about 2 – 3 days before the current week's tutorial.

M-Tutorials Three tutorials to help you quickly learn the basics of GNU Octave. GNU Octave has many of the functions that Matlab has, and is adequate for many tasks that we encounter in designing simple control systems. In this course, we visit only those functions of GNU Octave that are also present in Matlab. These tutorials aim to help you learn GNU Octave to a stage from where you can further explore it and Matlab on your own. These tutorials will be conducted by the TAs.

Dates: Will be announced later.

M-quiz We plan to have one 50-minute quiz on GNU Octave. This quiz will help you round off your practice of this software.

Date: After mid-semester recess.

In-tutorial quizzes There will be three 20 – 30 -minute quizzes evenly spaced before the mid-semester recess.

Mid-semester exam and End-semester exam 1 exam of 2 hours, and 1 exam of 3 hours. Based on lectures, tutorials, quizzes. Questions to test recall of concepts, analytical & creative thinking.

If you find any topic in the course hard to understand, I suggest that you first discuss it with your course-mates. If you and they are still unable to figure out the answer, you are welcome to e-mail me your questions (I will send an answer to the entire class), or visit me in my office.

Grading system

Your letter grade will be based on:

3	20 – 30 -minute in-tutorial quizzes	18%
1	M-quiz	13%
1	Mid-sem Exam	25%
1	End-sem Exam	40%
EI	Extraordinary insights	4%

The EI component is as follows. If you demonstrate through the semester insights that I feel are extraordinary, I may award you up to 4 points at the end of the semester. These points are not open to debate, and are based purely on my impressions in my interaction with you.

Policy on make-up quiz/exam

Failure to take a test as per the schedule agreed upon in our lectures will result in a grade of zero for that test. Due to the large number of students in the class and, consequently, due to the large volume of grading involved, make-up exams will not be given.

Course content

Negative feedback control systems, Linear time-invariant dynamic systems, Transfer function, Mason's gain formula, Frequency and time domain analysis, Performance analysis, Nyquist stability criterion, Bode plots, Feedback system design using Bode plots, Analysis using root locus, PID control, State space models.