

EE 250: Control Systems Analysis (3-1-0-0-11)

1. Course Objectives

This course aims at imparting the basic concepts of linear systems with focus on modelling of systems, representation using transfer functions, time-domain analysis, frequency response, controller designs, state-space representations.

2. Prerequisites

Students should have completed a course on signals and systems.

3. Course Contents

Negative feedback control systems, Linear time-invariant dynamic systems, transfer function, Mason's gain formula, frequency and time domain analysis, performance analysis, Root Locus, Bode plots, Nyquist plots, Nyquist stability criterion, Feedback system design using Bode plots and root locus, PID control, State-space models.

4. Instructor

Soumya Ranjan Sahoo (srsahoo@iitk.ac.in)

5. Venue (for 2023-24 Sem 2)

Lectures: L07, LHC

Tutorials: T101, T102, T103, T104, T105. Sixth tutorial to be announced soon.

6. Time (for 2023-24 Sem 2)

Lectures: 11 am to 12 noon (Tuesdays, Thursdays, Fridays)

Tutorial: 11 am to 12 noon (Wednesdays)

7. Class management

The course will be managed on HELLO, IITK powered by MOOKIT on <https://hello.iitk.ac.in/>. The materials for the course will be posted on the course page of HELLO, IITK, and will be emailed.

8. Assignments

Assignments will be given at regular intervals for understanding the concepts taught during the lectures. The assignments will be mailed and / or posted on the course management page of HELLO, IITK. The assignments will not be used for grading and for practice only.

9. Evaluation Scheme

The evaluation will consist of mini quizzes, major quizzes, midsem exam and endsem exam.

The dates of the exam will be announced.

- MINI QUIZ
 - No.: same as number of tutorials
 - Duration: 10 mins (at the beginning of the tutorial hour)
 - Marks: 10 (each quiz)
 - Weightage: 25 %
- MAJOR QUIZ:
 - No.: 2
 - Duration: 30 – 40 mins
 - Marks: 50 (each quiz)
 - Weightage: 25 %
- MIDSEM:
 - No.: 1
 - Duration: as specified by institute
 - Marks: 100
 - Weightage: 25 % (each quiz)
- ENDSEM:
 - No.: 1
 - Duration: as specified by institute
 - Marks: 100
 - Weightage: 25 % (each quiz)

Please note that all exams are compulsory. NO MAKE-UP EXAMS FOR MINI QUIZZES AND MAJOR QUIZZES.

Student may get a failing grade if the total marks (out of 100) obtained by the student is less than 30.

Missing the EndSem exam will lead to an Incomplete (I) grade in the course. The grade (I) will be converted to a suitable grade if the absentee takes the Make-up EndSem exam after suitable permission(s) from the required authority. In case the absentee does not appear for the Make-up EndSem for whatsoever reason, the grade (I) will be converted to grade (F).

10. Attendance Policy

Attendance will not be taken in the class.

11. References

A few reference books are listed below:

- Richard C. Dorf and Robert H. Bishop, “Modern Control Systems”, 12th edition, Pearson.
- Norman S. Nise, “Control Systems Engineering”, 6th edition, Wiley.
- Katsuhiko Ogata, “Modern Control Engineering”, 4th edition, Prentice-Hall India.

Please note that the references are not limited to above mentioned books.