Course Title (Code): Robust Control Systems (EE654)

Instructor: Dr Abhilash Patel (apatel[at]iitk.ac.in)

Teaching Assistants: Sura Sivareddy (ssura23[at]iitk.ac.in), Manish K Meena (241040042[at]iitk.ac.in)

Course webpage: https://home.iitk.ac.in/~apatel/teaching.html

Lectures Time: WF, 9.00AM-10.15AM

Lectures Venue: T101

Office Hour: on email request

Prerequisites: Basic understanding of classical and modern control systems

Objective of the course: To learn control-theoretic approaches for robustness analysis against uncertainty and controller design to ensure robust performance

Tentative Contents:

- Preliminaries of system and signals
- Modeling uncertainties: unstructured, parametric, structured
- Robust Design Specifications: Gain/phase margins, Stability
- Limitation and tradeoffs
- Robustness and sensitivity analysis
- Robustness analysis with classical controllers, and possible way for improvement
- H_∞ controller design
- H_2 controller design
- Robustness analysis for nonlinear systems
- Incremental stability
- Robustness design in nonlinear systems
- Improving robustness through controllers

Grading Policy:
Mid Sem Exam- 20%
End Sem Exam- 30%
Course Project- 30%
Assignments-10%
Quizzes- 10%

Recommended Textbooks:

1. Sigurd Skogestad, Ian Postlethwaite, Multivariable Feedback Control: Analysis and Design, Wiley, Second Edition
2. John C. Doyle, Bruce A. Francis, Allen R. Tannenbaum, Feedback Control Theory, Dover Publications, First Edition
3. Michael Green, David JN Limebeer, Linear Robust Control, Dover Publications, First Edition
4. Da-Wei Gu , Petko H. Petkov , Mihail M Konstantinov, Robust control design with MATLAB, Springer, Second Edition