Course Title	**Automatic Control**
Course Code	**EE3409**
No. of Credit Hrs (Lecture + Tutorial + Lab)	**4 (3+0+1)**
No. of Contact Hrs (Lecture + Tutorial + Lab)	**5 (3+0+2)**
Level-Year	**6-3**
Prerequisite (if any)	**EE3302**

1) Course Objectives:

The main objective of the course is to acquire the basic concepts of control systems' analysis; particularly, to learn the basics of control systems representations/modeling and stability analysis (in time and frequency domains), in addition to practical experiment in the laboratory.

2) Expected Learning Outcomes:

Upon completion of this course, student will be able to:

1. Identify and describe the fundamentals of modeling electrical, mechanical, and electromechanical systems. PLO1 [1]
2. Summarize and explain the properties of feedback control systems and basic control actions. PLO1 [1]
3. Apply control system design techniques to single-variable continuous systems in both time and frequency domains. PLO2 [2]
4. Model and investigate electrical, mechanical, and electromechanical systems using practically relevant techniques. PLO3 [6]
5. Communicate and collaborate effectively in teams to propose simple and relevant control system applications. PLO7 [5]
6. Engage in self-directed learning to explore modern control strategies and their applications. PLO9 [7]

3) Course Contents

1. System Representation,
2. State Variable Analysis,
3. Stability Analysis,
4. Time Domain Analysis,
5. Root Locus, Bode Plots, Nyquist Plots,
6. System Modelling,
7. Introduction to Basic Control Design.

4) Automatic Control Lab Contents:

Experiments are organized in several groups of real time applications, such as:

1. Step Response analysis of 1st and 2nd order System.
2. Frequency Response of 1st and 2nd order System.
3. Root Locus Plot of a given system.
4. Bode plots of a given system
5. Nyquist plots of a given system
6. Lead-Lag compensation design
7. PID controller design
8. Speed control of DC motor
9. Position Control.

5) Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

6) Mode of Evaluation: Course Assessment Methods

- Quizzes , Assignment, Homeworks, Reports, Presentations etc.
- Lab Work
- Mid Exam
- Final Exam

Evaluation

No	Assessment Activities *	Percentage
1.	Assignments/Quizzes/HomeWorks/Mini-Projects/Presentations/Reports+Quizzes	15%
2.	Mid Exam	25%
3.	Lab/Tutorial (Lab Exam)	10%
4.	Lab/Tutorial (Lab Reports)	10%
5.	Final Exam	40%

7) Textbook(s):

- Control System Engineering, Norman S. Nise, 5th Edition, John Wiley &Sons
- Lab Manual.

8) References:

- Modern Control Engineering (4th edition) by K. Ogata, 2002
- Feedback Control of Dynamic Systems by Gene F. Franklin, J. David Powell and Abbas Emami Naeini, 4th Edition, Prentice Hall, 2002.