

| Course Title | Course Code | Credit Hours |
|--------------------------|--------------------|---------------------|
| Modelling and Simulation | AE-493 | 3-0 |

Textbooks:

- Jerry Banks, "Discrete-Event System Simulation, Banks, Prentice-Hall
- Steven I. Gordon, "Introduction to Modeling and Simulation with MATLAB and Python", CRC Press

Course Objective:

This course is aimed to help students:

- Gain adequate knowledge needed to analyse various engineering components based on correct engineering methodology.
- Learn to model various multi-physic systems on correct engineering methodology.

Course Outline:

- Introduction to Various Test Signals in System Analysis
- Overview of Graphical Mathematical Modeling Techniques
- Mathematical Modeling of Engineering Systems
- Analysis of Translational and Rotational Systems
- Modeling of Electrical and Electro-Mechanical Systems
- Introduction to Laplace Transforms in Control Systems
- Application of Inverse Laplace Transforms in Control System Analysis
- Concepts of Non-Linearity and Linearization in System Modeling
- Time Response Analysis of First-Order Systems
- Time Response Analysis of Second-Order System
- Methods for Transient Response Analysis in Control Systems
- Introduction to MATLAB for System Design and Implementation
- Design and Implementation of Control Systems Using MATLAB
- Overview of SIMULINK for System Modeling
- Introduction to M-Files in MATLAB for System Design
- Utilization of S-Functions in Simulink for Advanced Modeling
- Practical Applications of Simulink for Control System Simulation
- Integration of MATLAB and Simulink for Comprehensive System Analysis