United States Naval Academy
Department of Weapons, Robotics, and Control Engineering

Course: EW301 Modeling and Simulation

Credits: 3 credit – 2 recitation hours – 2 laboratory hours

Course Description: This course covers the fundamentals of developing, simulating, and validating models for dynamic systems. Using first principles, students develop equations of motion for mechanical and electrical systems. Transfer functions and state space are introduced as forms for representing these dynamic models. Dynamic system responses are evaluated numerically using Matlab and Simulink. Additionally, the frequency response of linear dynamic systems is evaluated and used in the design of filters.

Pre-requisites: EW202 Principles of Mechatronics, EM232 Dynamics,. Coreq: EW305/EW305H Linear Controls

Course Coordinator: Assoc. Prof. Jeremy Dawkins

Textbook: None

Course Objectives:
Derive a physics based dynamic model of a system using first principles
Represent dynamic model in alternative forms
Numerically evaluate a dynamic model to predict system response
Collect and analyze experimental data
Understand the frequency response of a system
Run experimental tests to determine system parameter values

Topics:
Rotational and Translation Systems
Gear Trains and Kinematic Constraints
Electrical Systems
Transfer Functions
State Space
Simulink Diagrams
Non-linear Systems and Linearization
Frequency Response
Filter Design

Last Updated: 15-December-2020