THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Stability and Control of Flight Vehicles

AEROENG 5620

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Analysis and design of aircraft, helicopter and missile flight control systems and the associated guidance and navigation systems.

Prerequisites and Co-requisites:
Prereq: 3521 (521).

Course Goals / Objectives:
- Educate students about the fundamental techniques of automatic control theory in transfer function framework
- Train students to develop skills in translating physical system requirements to mathematical design specifications
- Enable students to apply these techniques to aircraft and spacecraft control systems analysis and design

Course Topics:
- Review of Aircraft Flight Dynamics Equations of motion, with extension to Maneuverability point
- Generation of Aircraft Transfer functions, and State Space Models with trim condition determination; Description of various Aircraft Flight Control Systems such a Stability Augmentation Systems; Control Augmentation Systems; Autopilots
- Aircraft Handling qualities and Flying Qualities and their role in Flight control systems
- Inertial Sensors and Attitude Determination
- Disturbance Modeling: Atmospheric Gust Function modeling, Wind shear and Microbursts
- Introduction to Aircraft Guidance and Navigation Systems
- Longitudinal Control Systems: Pitch displacement autopilot; A/C Longitudinal Autopilot design (Pitch control, Automatic Landing control systems)
- A/C Lateral Autopilot Design (Yaw Dampers, Turn Coordination)
- Flight Path Control Systems and Flight Management Systems
- Inertial Cross Coupling and Other Flight Control Systems Issues such as nonlinear simulation of limiters; Structural Flexibility and its effect on Aircraft motion
- Helicopter and Missile Control Systems (aerodynamic and ballistic)
- Pilot modeling and PIO (Pilot Induced Oscillations); UAVs
- Introduction to Multivariable Flight Control: LQR, Eigenstructure Assignment ; Introduction to statistical design principles

Designation:
Elective