AerE 355   Aircraft Flight Dynamics and Control (Fall 2016)

MWF 12:10 – 1:00 pm Howe 2202
MWF   2:10 – 3:00 pm Beyer 1310

Instructor: Prof. Bong Wie, 294-3124, Howe Hall 2355,   bongwie@iastate.edu

Office Hours: MWF 10:00 am – 11:00 am, 3:10 pm – 4:00 pm or by appointment

Course Catalog Description: ***Prereq: AerE 261 (Introduction to Performance and Design), Math 267 (Differential Equations and Laplace Transforms), EM 345 (Dynamics).*** Aircraft rigid body equations of motion, linearization, and modal analysis. Longitudinal and lateral-directional static and dynamic stability analysis. Flight handling characteristics analysis. Longitudinal and lateral-directional open loop response to aircraft control inputs. Aircraft flight handling qualities.

   Aer E 331. Flight Control Systems I. (3-0) Cr. 3. S. *Prereq: AerE 355*. Linear system analysis. Control system designs using root-locus and frequency response methods. Applications in flight control systems.

Objectives: AerE 355 is a junior-level course on aircraft flight dynamics and control. This course introduces the physical concepts and mathematical tools required for the analysis and control of six degrees-of-freedom (6DOF) motions of airplanes/UAVs/drones/missiles. Mathematical modeling, analysis, and Matlab simulation of aircraft/missile flight dynamics/control problems of practical interests are emphasized.

Text: *Flight Stability and Automatic Control*, Nelson, 2nd Edition, McGraw-Hill, 1998.

Grading: Test #1 (15%), Test #2 (15%), Test #3 (15%), Matlab Simulation HW (15%),
         Final (40%, comprehensive exam)
         All closed-book and closed-note tests without calculators
         Sample test problems will be provided

Course Contents and Schedule (Tentative)

- **Review of Math 267 and EM 345**
- **Chapter 1   Introduction (Review of AerE 261)**
- Chapter 2   Static Stability and Control
- **Test #1 (Sept. 14)**

- Chapter 3   Aircraft 6DOF Equations of Motion
- **Test #2 (Oct. 12)**

- Chapter 4   Longitudinal Motion (Stick Fixed)
- Chapter 5   Lateral Motion (Stick Fixed)
- **Test #3 (Nov. 16)**

- Chapter 6   Aircraft Response to Control or Atmospheric Inputs
- **Final Exam (Comprehensive)**
         Beyer 1310 Section: Dec 15 (Thursday), 12:00 – 2:00 pm
         Howe 2202 Section: Dec 16 (Friday), 9:45 am – 11:45 am