

- Course Number and Title: A E 464. Advanced Flight Dynamics and Controls
- Catalog Description: Advanced airplane flight dynamics and stability control system design, longitudinal and lateral autopilots, missile / rocket control systems, and guidance systems; crosslisted with A E 564
- Credit Hours: 3 Credits (3)
- Prerequisite(s) / Corequisite(s): Prerequisite(s): A E 364 or consent of instructor  
Corequisite(s): None
- Required: Elective for BSAE Degree
- Course Availability: Spring Semester
- Instructor (Usual): Dr. Young S. Lee (See <https://mae.nmsu.edu/people/faculty.html>)
- Textbook:
  1. **Flight Dynamics and Controls:** (i) Nelson, R.C., *Flight Stability and Automatic Control* (Chap. 6-10); (ii) Pamadi, B.N., *Performance, Stability, Dynamics and Control of Airplanes* (Chap. 5-9); (iii) Bossert, D.E., *Introduction to Aircraft Flight Mechanics* (Chap. 8-11); (iv) Blakelock, J.H., *Automatic Control of Aircraft and Missiles*.
  2. **Control Engineering:** (i) Ogata, K., *Modern Control Engineering*; (ii) Franklin, G.F., *Feedback Control of Dynamic Systems*
- Course Learning Objectives: After completing this course, a student should be able to:
  - 1) Construct a block diagram to find a transfer function for a dynamical system;
  - 2) Perform a control systems design by utilizing various linear control theories such as root-locus design method, bode / Nyquist plots, and lead / lag compensation techniques;
  - 3) Understand longitudinal / directional / lateral dynamic flight stability controls associated with airplane designs; and
  - 4) Design autopilot systems of an airplane with some knowledge in flight instrumentation.
- Topics Covered: Laplace transform, block diagram, transfer function, transient / steady-state response analysis and tracking, Routh stability criteria, root-locus design method, Bode diagram, Nyquist stability criterion, compensation techniques and PID controllers, longitudinal / directional / lateral dynamic flight stability and controls, autopilot system design