- **Course Number and Title:** M E 333. Intermediate Dynamics

- **Catalog Description:** Three dimensional kinematics and kinetics, orbital motion, Lagrange s equations, dynamic stability, and controls.

- **Credit Hours:** 3 Credits (3)

- **Prerequisite(s) / Corequisite(s):** Prerequisite(s): M E 328 and ENGR 234
Corequisite(s): None

- **Required:** Required for BSME Degree (as Mechanics Elective)

- **Course Availability:** N/A

- **Instructor (Usual):** N/A

- **Textbook:** Meirovitch, L., *Methods of Analytical Dynamics*, McGraw-Hill (or Dover), 1970

- **Course Learning Objectives:** After completing this course, a student should be able to:

  1) Derive the equations of motion for particles and rigid bodies based on analytical dynamics theories;

  2) Study linear/nonlinear dynamical systems with their equations of motion by finding the associated solutions and by performing simulations; and

  3) Apply dynamics theory to engineering applications in vehicle dynamics, gyroscopes, aircraft / spacecraft dynamics, and celestial mechanics.

- **Topics Covered:**
  - Principle of virtual work
  - D'Alembert's principle
  - Hamilton's principle
  - Jacobi's least action principle
  - Lagrange equations of motion
  - Euler's equations of motion
  - Qualitative stability analysis of conservative systems
  - Stability of MDOF autonomous systems
  - Gyroscopes
  - 3-body dynamics in celestial mechanics
  - Spacecraft dynamics for satellite attitude stability