1. *Course number and name*

   MEE 452: Aircraft and Automobile Structures

2. *Credits and contact hours*
   3 credits; 3 hours per week

3. *Instructor's or course coordinator's name:*
   Course coordinator: Masoud Rais-Rohani, Richard C. Hill Professor, Mechanical Engineering

4. *Text book, title, author, and year* None
   a. other supplemental materials

   An extensive set of instructor-developed handouts will be used in lieu of a textbook.

5. *Specific course information*

   a. brief description of the content of the course (catalog description)

   Introduction to aircraft and automobile structures. Structural mechanics of thin-walled stiffened and unstiffened members. Analysis and design of single- and multi-cell structures under torsion, bending, shear, and combined loading conditions. Instability and failure analysis of thin-walled columns and stiffened panels. Energy absorption in single- and multi-cell tubular members.

   b. prerequisites or co-requisites:
   Prerequisite: MEE 251

   c. indicate whether a required, elective, or selected elective course in the program

   Technical elective for Mechanical Engineering

6. *Specific goals for the course*

   a. specific outcomes of instruction.

   By the end of this course, students will demonstrate an ability to:
   - Summarize key attributes of aircraft and automobile structures, loads, choice of materials and manufacturing techniques, and regulations governing their safety (ABET Student Outcomes a, e, k).
   - Analyze thin-walled and stiffened structural members under torsion, bending, and shear loading and calculate the resulting stresses (ABET Student Outcomes a, e, k).
   - Predict elastic or inelastic buckling instability in columns with stable cross-sections (ABET Student Outcomes a, e, k).
   - Predict the bending and buckling responses of thin rectangular plates (ABET Student Outcomes a, e, k).
   - Determine the compressive strength and failure mode of structural members with unstable cross-sections (ABET Student Outcomes a, e, k).
   - Analyze and design sheet-stiffener panels under axial loading (ABET Student Outcomes a, e, k).

- Perform preliminary analysis of wing and fuselage structures (ABET Student Outcomes a, e, k).

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcomes: [a] an ability to apply knowledge of mathematics, science, and engineering, [e] an ability to identify, formulate, and solve engineering problems, [k] an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

7. *Brief list of topics to be covered*

- Anatomy, Materials, Manufacturing, Loads and Standards
- Elastic Torsion and Bending of Thin-Walled Structures
- Buckling of Structural Members with Stable Cross-Sections
- Bending and Buckling of Thin Rectangular Plates
- Strength of Structural Members with Unstable Cross-Sections
- Analysis and Design of Sheet-Stiffened Panels