OVERVIEW

The course consists of the conceptual/preliminary design of an airplane, with the first iteration in AE 460A and a second iteration, with additional requirements, in AE 460B.

PREREQUISITES

* AE 302 High Speed Aerodynamics
* AE 303 Experimental Aerodynamics
* AE 310 Aerospace Structural Analysis

PROJECTS

Design projects are described in detail by material provided by the instructor. There are three project options for this year: Air Force Advanced Pilot Trainer (APT), Close Air Support aircraft (CAS), or Supersonic Business Jet (SBJ). The following constraints and conditions apply:

* Teams shall be a minimum of 5 students, with a maximum of 6.
* Technical and administrative guidance will be provided by the instructor.
* Tasking, grading and general format and content is specified in the ***Statement of Work (SOW)***
* ***Technical Memos*** and ***Design Reports*** shall follow the ***Statement of Work (SOW)*** and ***Report Content Requirements (RCR).***
* A **System Requirements Review (SRR)** will be held in early October.
* A **Peer Review** (PDR with peers) informal oral presentation will be made in early November.
* A **Preliminary Design Review (PDR)** formal oral presentation will be made to a panel selected from the industry in late April.
* To ensure a variety, the instructor will assign the student projects, but will based on the order of the team’s requested preference.

CLASS SCHEDULE

Students should attend all scheduled classes until the instructor indicates otherwise. Team meetings will be scheduled throughout the semester and information will be passed through the Project Managers. See ***Schedule and Assignment*** list for details.

TEAMS

Students will form teams and take on tasks from their chosen project (the instructor reserves the right to adjust team makeup as required). Each group will select a Project Manager who will plan and coordinate the group effort. The Project Manager attends meetings with the instructor beyond those attended by all students. The Project Manager assigns work to the Design Leads and follows up on performance. The Project Manager must address any cases in which a student does not carry his/her share of the load, involving the instructor as appropriate. Where a project goes particularly well, the group leader can expect a higher grade than the group median or a letter of commendation where the median grade is an “A”. The group leader may unilaterally step down at the end of AE 460A in which case the group will select another Project Manager for AE 460B.

READING ASSIGNMENTS

Reading assignments will come from the text (Nicolai and Roskam) and from other relevant sources. See ***Schedule and Assignment*** list for details.

DESIGN NOTEBOOKS

Each student will maintain their own design notebook and shall have them on hand during class meetings, lab periods and instructor meetings/design reviews. Content varies from student to student, but the information should include all work associated with their tasking.

INSTRUCTOR REVIEWS

Teams will meet with the instructor on a regular basis to review progress and discuss the team’s aircraft design.

PEER REVIEWS

Reviews will be conducted throughout the year by your classmates. These reviews will be conducted informally with an instructor-specified format. The attendees will be teams from different projects, i.e. APT groups will review the CAS groups, CAS groups review SSBJ groups, and SSBJ groups review the APT groups.

REPORTS

Reports are due at the end of the semester. See ***Schedule and Assignment*** list for due dates. Reports will not be returned. Copies as desired should be made prior to submittal. Feedback from the fall report will be given to groups in the spring. Teams shall review the feedback and incorporate the recommendations as required.

GRADES

Grades are based on design reviews, presentations, technical memos and design reports. Course grades will be assigned on a +/- basis. See **SOW** for more details

TOUR
A tour will be made of local industry, Air and Space Museum or the Miramar Air Show. This tour will be held in the first semester to allow students to view aircraft in order to gain an appreciation of the design task. The event will include industry professionals to talk with students about aircraft design.

REFERENCES REQUIRED

One copy per student:

(1) *Fundamentals of Aircraft and Airship Design, Volume 1 – Aircraft Design*, by Nicolai, American Institute of Aeronautics and Astronautics (2010).

One copy per group:

(2) *Airplane Design* by Roskam, DARcorporation (Latest printing)

(3) *Theory of Wing Sections* by Abbott and Van Doenhoff, Dover (1959)

Other reference should be used, i.e. DATCOM, NACA, etc, as specified in the required references.

STUDENT EDUCATIONAL OUTCOME

At the conclusion of AE 460B, the student is expected to have reached most of the following goals:

1. An ability to apply knowledge of mathematics, science, and engineering (ABET Criterion 3a).

2. An ability to design and conduct experiments, as well as to analyze and interpret data (ABET Criterion 3b).

3. An ability to work on multi-disciplinary teams to design a complex system, such as aircraft or spacecraft, from conceptual to preliminary design, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (ABET Criterion 3c, 3d & 3j).[[1]](#footnote-1)

4. An ability to identify, formulate, and solve engineering problems (ABET Criterion 3e).

5. An understanding of professional and ethical responsibility (ABET Criterion 3f).

6. An ability to communicate effectively, using oral, written and graphical communication skills (ABET Criterion 3g).

7. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (ABET Criterion 3h).

8. A recognition of the need for, and an ability to engage in, life-long learning (ABET Criterion 3i).

9. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (ABET Criterion 3k).

10. An understanding of aerodynamics, aerospace materials, structures, propulsion, flight mechanics, and stability and control.

1. AE460 uses a System Requirements Document of realistic aircraft design requirements to fulfill this outcome. Included is a knowledge of contemporary issues needed to design the system. [↑](#footnote-ref-1)