AME 481

Department of Aerospace and Mechanical Engineering
University of Southern California

Course Syllabus

Spring 2021
(20 Jan. 2021)

AME 481
Aircraft Design
Units: 4

Instructor: Marty K. Bradley, Ph.D
Email: mkbradle@usc.edu
Office Hours: Tuesdays 4:00pm–5:00pm

Instructor: David S. Lazzara, Ph.D
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Instructor: Hubert Wong
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Office Hours: Fridays 10:00am–12:00pm

Grader: Vaideya Chavan
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Lecture Room: THH 210 and Online
Lecture Time: Mondays 3:30pm–6:10pm

Lab Room: SAL 127 and Online
Lab Time: Wednesdays 5:00pm–8:00pm

Course Description

This course provides a comprehensive overview of principles and analysis related to aircraft design. Various topics are presented to summarize an organized approach to aircraft design problems with a multidisciplinary emphasis. Lectures provide a summary of design principles, aircraft components, specifications, design best-practices, conventional and unconventional vehicles, and information on quantifying aircraft performance at the system and sub-system level. Lab sections will provide practical implementation of lecture material, including in-depth instruction on exercising various analysis and design tools for aerodynamics, structures, configuration layout, CAD and many other topics. Both lectures and labs will enable students to analyze and design existing or new aircraft configurations via a variety of weekly homework assignments and a design project presented at the end of the semester.

Assignments

Homework assignments will be assigned most weeks throughout the semester in lecture and will be due by the start of lab the following week. Lab assignments will be assigned in most labs and will either be due at the end of the lab section or before the start of the next lab

section. Assignments should be submitted electronically in PDF format via the Blackboard class website.

The homework, lab, and project assignments are designed for students to practice and demonstrate important skills pertaining to aircraft design. Students will be expected to apply the resources and material taught in lecture, lab and prior engineering course-work when completing assignments for this course.

Most homework assignments are related to the aircraft design project by working you through the processes you will need to follow to complete a task in the project. Some homework assignments will not be directly related to the aircraft design project, but nevertheless will provide practice and demonstrate other important skills or information. For the student's convenience, some lectures, labs, and homework material may reference the sections of the project they support.

An airline customer network study will be conducted early in the semester and will determine the aircraft design missions for the aircraft design project later in the semester. Students will make group presentations.

An aircraft design project will be assigned approximately halfway through the semester. Students will submit their own formal project report at the end of the semester as well as a group presentation. These will also be submitted electronically in PDF format to the Blackboard website. See the project definition document for further information.

Course Grading

The grading scale for AME 481 is summarized as follows:

Assignment	**Weighting**
Total Homework	30%
Total Lab Assignments	20%
SRR Presentation	5%
PDR Presentation	10%
Final Project Report	35%
Total	100%

Each homework assignment is weighted equally in the final grade. Late assignments will not be accepted, except for verified medical reasons.

Grade Definitions

The USC Office of Academic Records and Registrar provides the following grade definitions used in this course (see Grading and Correction of Grades Handbook):

Grade	Definition
A	Work of **excellent** quality
B	Work of **good** quality
C	Work of **fair** quality
D minus	Work of **minimal** passing quality
F	Work that does not meet **minimal** standards for passing the course

Course Schedule

Week	Date	Lecture	Material	Homework
1	Jan. 18	–	No Class	
2	Jan. 25	1	Aircraft Configuration Design	1
3	Feb. 1	2	Mass Properties & Economics	2
4	Feb. 8	3	Propulsion	3
5	Feb. 15	–	No Class	
6	Feb. 22	4	Aerodynamic Performance	4
7	Mar. 1	5	High-Speed Aerodynamics	5
8	Mar. 8	6	Structures (Project Phase B Start)	6
9	Mar. 15	7	Design Principles	
10	Mar. 22	8	Design Optimization & Trade Studies	–
11	Mar. 29	9	High-Lift Aero / Mission Performance	–
12	Apr. 5	10	PDR Group Presentations	–
13	Apr. 12	11	Stability & Control	–
14	Apr. 19	12	Systems, Safety, Fuel, Environment, Emissions, & Acoustics	–
15	Apr. 26	13	Electric Aircraft Design	–

Students that have previously approved "Time Conflict Forms" for the AME-481 lecture will have to attend the live Group Presentations on April 12th and the Final Project Reporting on May 7th.

Week	Date	Lab	Material
1	Jan. 20	1	Course Intro. / JetSizer Tutorial / Mission Sizer
2	Jan. 27	2	Fuselage Design
3	Feb. 3	3	Aircraft Operations
4	Feb. 10	4	Propulsion Sizing
5	Feb. 17	5	Network Analysis & Optimization (Project Phase A Start)
6	Feb. 24	6	Aerodynamic Performance
7	Mar. 3	7	SRR / Network Analysis Presentations
8	Mar. 10	8	Structures Modeling
9	Mar. 17	9	Design Optimization
10	Mar. 24	10	Trade Studies with JetSizer
11	Mar. 31	11	Airfoil / Wing Design
12	Apr. 7	-	Wellness Day
13	Apr. 14	12	Stability & Control
14	Apr. 21	13	Unique Trade Studies
15	Apr. 28	14	Final Project Question Session

Lab Assignments will be started during lab and completed outside the lab if necessary.

Students that have previously approved "Time Conflict Forms" for the AME-481 Lab will have to give priority to lab sessions. Most AME-481 Labs will have live interactive projects and there will be live Group Presentations on March 3rd.

Week	Date	Time	Deliverable
7	Mar. 3	5:00 PM	System Requirements Review (SRR) Network Study Presentation Slides
12	Apr. 5	3:30 PM	Preliminary Design Review (PDR) Slides
16	May 7	4:00 PM	Individual Project Report

Academic Integrity

Each student is responsible for completing and submitting their own work on assignments. Students are encouraged to discuss the assignments, but must ensure there is no plagiarism involved when creating and submitting their own work. Plagiarized assignments will receive no credit; students will only receive credit for their own work. Before submitting any assignment in AME 481, please ask the instructor to clarify any questions regarding what constitutes plagiarism if ambiguity exists. The following is a non-exhaustive list of examples that will be considered plagiarism:

- Copying codes/scripts programmed by someone else and submitting it without proper reference to the original author.

- Submitting copies of another student's completed assignment, in whole or in part, as one's own.
- Submitting plots or images not generated by the student and without proper reference to the original author.
- Submitting tables of text and/or data not generated by the student and without proper reference to the original author.
- Submitting text not generated by the student and without proper reference to the original author.

In order to minimize the likelihood of committing plagiarism, students shall do the following on AME 481 assignments:

- Program their own code and scripts.
- Create their own plots and images; reference the source of images they did not generate themselves.
- Write their own mathematical derivations.
- Write their own text in response to assignment questions.
- Write their own tables of text and/or data.
- Report data and results as generated by the codes/scripts the student programmed themselves.

AME 481 students suspected of plagiarism will be reported to the USC Student Judicial Affairs and Community Standards (SJACS) office for academic integrity violations. The official USC statement on academic integrity is the following (copied verbatim from `http://www.usc.edu/schools/GraduateSchool/academic_conduct.html`):

Statement on Academic Conduct and Support Systems

Plagiarism - presenting someone else's ideas as your own, either verbatim or recast in your own words - is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, *Behavior Violating University Standards and Appropriate Sanctions*, accessible here: `http://studentaffairs.usc.edu/scampus/`. Other forms of academic dishonesty are equally unacceptable. See the university policies on scientific misconduct: `http://policy.usc.edu/scientific-misconduct`.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* `http://equity.usc.edu/` or to the *Department of Public Safety* via either of these forms: `http://dps.usc.edu/contact/report/` or `http://web-app.usc.edu/web/dps/silentWitness/`.

The Center for Women and Men `http://engemannshc.usc.edu/cwm/` provides 24/7 confidential support, and the sexual assault resource center web-page `http://sarc.usc.edu/` describes reporting options and other resources.

Help with scholarly writing is provided by a number of USC's schools. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* `http://ali.usc.edu`, which sponsors courses and workshops specifically for international graduate students.

Help arranging accommodation for students with disabilities is provided by the *Office of Disability Services and Programs* `http://dsp.usc.edu`

Emergency information will be posted at `http://emergency.usc.edu`. If an officially declared emergency makes travel to campus infeasible, this website will provide safety and other updates, including ways in which instruction will be continued by means of Blackboard, teleconferencing, and other technology.

Due to the COVID-19 pandemic special accommodations may need to be made. USC has altered certain semester registration and grading practices and students should refer to university communications. It is possible that all lectures and labs will be virtual. If you need special personal accommodations due to illness, exposure or possible exposure, quarantine restriction, or a requirements to take care of a family member, please let your professors know as early as possible to work out the issue.

Zoom Etiquette

"Netiquette" or "internet etiquette," describes the recommended communication and behavior of online communication. In our course the same expectation of orderly, respectful dialogue for in-person lectures will exist in virtual lectures to help minimize the chances of miscommunication and perceived disrespect. Students shall mute their microphones during virtual lectures and are not required to have webcams operating during the lectures, although it is recommended if available. Students may submit questions via the chat feature in Zoom or verbally after un-muting their microphone.

Synchronous Session Recording Notice

Synchronous sessions will be recorded and provided to all students asynchronously.

Sharing of Course Materials Outside of the Learning Environment

USC policy prohibits sharing of any synchronous and asynchronous course content outside of the learning environment.

SCampus Section 11.12(B)
Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).

USC Technology Support Links

Zoom information for students
Blackboard help for students
Software available to USC Campus