USC Viterbi School of Engineering

AME 105 Introduction to Aerospace Engineering

Units	**4**	
Term	**Fall 2018**	**M Aug 20th – F Nov 30th**
Section	**28706 Lecture**	**28707 Lab**
Day/Time	T/Th 9:30-10:50a	Th 2 – 4:50p
Location	WPH B28	SAL 127

See course Blackboard/Piazza page for updates

Instructor	**Charles Radovich**
Office	RRB 202
Office Hours	M 2-4p, T 11a-12p, W 12-1p and by appt.
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Teaching Assistant	**Michael Kruger**
Office	VHE 202
Office Hours	T 1-2p, Th 12-1p
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Course Description

Gateway to the Aerospace Engineering major. Introduction to flight vehicle performance and propulsion. Elements of the physics of gases. Laboratory: computers and graphics; model rocket and glider test flights. Topics covered include: engineering fundamentals, the standard atmosphere, Bernoulli and air speed measurements, airfoils, finite wings, aerodynamic coefficients, wing design, viscosity and boundary layers, drag, separated flows and turbulence, aircraft performance, and stability.

Co-Requisite (s): none
Recommended Preparation: none

Textbook

Required: John D. Anderson, Introduction to Flight, 8th Edition, McGraw-Hill, Inc.
*Required textbook can be any convenient edition from #4 onwards. Electronic ok. Also used in AME 261.

Recommended: The Simple Science of Flight, 2nd ed., H. Tennekes (2009) MIT Press
**Recommended. Read for fun. Cheap.

Grading

20% Homework | 10% Quizzes | 20% Midterm | 20% Glider Project | 30% Final

Discussion Board

This course will use Piazza for all class discussions. Refrain from emailing questions related to assignments, midterms, etc., and instead use Piazza. The TA, myself and even you can answer questions as they arise, thus providing an efficient means for communication. If you have issues accessing the Piazza, contact team@piazza.com directly. Before the semester begins, verify that you have access to these websites; Piazza is accessed from within the Blackboard page. **Recommended download**: Piazza App for phones. It works!

Exams

There is one Midterm and one cumulative Final Exam. See the course schedule.

Project

AME 105 includes a glider design project where theory is put into practice. Test flights will be conducted during AME Glider Day which takes place towards the end of the semester. Details for this year's project will be discussed in class. Follow these links for information from previous years: http://viterbivoices.usc.edu/betty-2017/ame-105-glider-test-day/ and https://vimeo.com/81151514.

Software

SolidWorks: student license available at http://www.solidworks.com/sdk
Matlab: student license available at http://software.usc.edu/
MS-Excel: student license available at https://itservices.usc.edu/officestudents/
These programs are also available in all USC computer labs.

Schedule

(current best guess)

Wk #	Lec #	Date		Chapters	Topics Covered
1	0	Tue	21-Aug	Ch.1 (history)	*Introduction / Engineering Fundamentals*
	1	Thu	23-Aug	Ch.2 (basic physics, units)	
2	2	Tue	28-Aug	Ch.3 (std. atm.)	*Eng. Fundamentals / Standard Atmosphere*
	3	Thu	30-Aug		
3	4	Tue	4-Sep	Ch.4.1-2 (continuity, compressibility)	*Introduction to Aerodynamics*
	5	Thu	6-Sep		
4	6	Tue	11-Sep	Ch.4.3-4 (Euler, Bernoulli Eq.)	*Bernoulli / Airspeed Measurement*
	7	Thu	13-Sep	Ch.10-11.1, 12.2 (pitot tubes)	
5	8	Tue	18-Sep	Ch.5.1-4 (airfoils, force coefficients,	*Airfoils / Aerodynamic Coefficients I*
	9	Thu	20-Sep	airfoil data)	
6	10	Tue	25-Sep		*Airfoils / Aerodynamic Coefficients II*
	11	Thu	27-Sep		*Begin Glider Project*
7	12	Tue	2-Oct	Ch5.5-6 (basics)	*Finite Wings / Induced Drag*
	13	Thu	4-Oct	Ch.5.13-15 (induced drag)	
8	14	Tue	9-Oct	Ch.5.17 (flaps)	*Real wings / Flaps / Wing Design*
	15	Thu	11-Oct	Ch.5.20-24 (historical)	
9	16	Tue	16-Oct	Ch.4.15-16 (laminar boundary layers)	*Viscosity / Boundary Layers*
		Thu	18-Oct	***Midterm Exam***	
10	17	Tue	23-Oct	Ch.4.20 (separation)	*Drag / Separation / Turbulence*
	18	Thu	25-Oct	Ch.4.17, 19, 21 (turbulence)	
11	19	Tue	30-Oct	Ch.6.1-3 (drag polar, thrust required)	*Aircraft Performance I*
	20	Thu	1-Nov		
12	21	Tue	6-Nov	Ch.6.3-6 (thrust and power)	*Aircraft Performance II*
	22	Thu	8-Nov		
		Fri	**9-Nov**	***AME Glider Day (tentative)***	
13	23	Tue	13-Nov	Ch.6.14 (L/D)	*Aircraft Performance III*
	24	Thu	15-Nov	Ch.6.13-14 (range and endurance)	
14	25	Tue	20-Nov	Ch.7.1-6 (static stability, longitudinal)	*Stability and Control*
		Thu	22-Nov	***Thanksgiving***	
15	26	Tue	27-Nov	Ch.5.6, 8-11 (compressibility)	*High-speed Flight*
	27	Thu	29-Nov	***Glider Project Data Report***	Last class / Review
		Thu	**6-Dec**	**11am - 1pm**	**FINAL EXAM**

Description and Assessment of Assignments

There will be one Midterm Exam held during the regular lecture time, and one Final Exam. All written exams will be closed book and closed notes unless noted otherwise. Homework sets will be assigned weekly. It is your responsibility to complete the problem set and to submit the assignment by hand before the due date.

Each assignment is due **before** class begins, or as specified in class announcements. Physical documents must be handed in; electronic submissions will not be accepted. **All assignments are due before the start of lecture. Late assignments will not be accepted. One microsecond (1 μs) late is considered late and there are no exceptions.**

In order to receive credit for your work, all homework and exam problems must be presented in a clear, organized manner. Solutions must show evidence of work; "magic" answers will not be accepted. Partial credit may be given if the solution is presented in a logical fashion. There are office hours throughout the week to help you with the course material; this time is best utilized when students come prepared with an attempt at a solution, thus allowing us to help you through your thought process.

There are no make-up assignments or exams. **The lowest homework grade and the lowest quiz score will be dropped from your total score; use this to your advantage if you have an upcoming conflict.** Everything else will count towards the final grade. Absences for medical reasons must be justified with some verifiable evidence; first obtain doctor's note, then see me.

All homework and exams are to be completed as an individual and should provide evidence of your effort and independent thoughts. Failure to comply with this requirement will result in a failing grade for the course. All students should read and understand the Academic Conduct in the subsequent sections.

Academic Conduct

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. Familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/b/11-00-behavior-violating-university-standards-and-appropriate-sanctions/, and **view the guidelines presented in Appendix A at the end of this document**. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and 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* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. 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://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://dsp.usc.edu/ provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

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Appendix A: Academic Dishonesty Sanction Guidelines

Violation	USC - Recommended Sanction for Undergraduates*	AME - Recommended Sanction for Undergraduates and Graduates
Copying answers from other students on any course work.**	F for course.	First offense: F on assignment. Second offense: F for course.
One person allowing another to cheat from his/her exam or assignment.	F for course for both persons.	If assignment: First offense: F on assignment. Second offense: F for course. If exam: F for course.
Possessing or using material during exam (crib sheets, notes, books, etc.) which is not expressly permitted by the instructor.	F for course.	First offense: F on exam. Second offense: F for course.
Continuing to write after exam has ended.	F for course.	F on exam
Taking exam from room and later claiming that the instructor lost it.	F for course and recommendation for further disciplinary action (possible suspension).	F for course
Changing answers after exam has been returned.	F for course and recommendation for further disciplinary action (possible suspension).	F for course
Fraudulent possession of exam prior to administration.	F for course and recommendation for suspension.	F for course
Obtaining a copy of an exam or answer key prior to administration.	Suspension or expulsion from the university; F for course.	F for course
Having someone else complete course work for oneself.	Suspension or expulsion from the university for both students; F for course.	F for course
Plagiarism — Submitting other's work as one's own or giving an improper citation.	F for course.	First offense: F on assignment. Second offense: F for course.
Submission of purchased term papers or papers done by others.	F for course and recommendation for further disciplinary action (possible suspension).	F for course
Submission of the same assignment to more than one instructor, where no previous approval has been given.	F for both courses.	F for both courses
Unauthorized collaboration on an assignment.	F for the course for both students.	First offense: F on assignment. Second offense: F for course.
Falsification of information in admission applications (including supporting documentation).	Revocation of university admission without opportunity to reapply.	Revocation of university admission without opportunity to reapply.
Documentary falsification (e.g., petitions and supporting materials; medical documentation.)	Suspension or expulsion from the university; F for course when related to a specific course.	Suspension or expulsion from the university; F for course when related to a specific course.
Plagiarism in a graduate thesis or dissertation.	Expulsion from the university when discovered prior to graduation; revocation of degree when discovered subsequent to graduation.***	Expulsion from the university when discovered prior to graduation; revocation of degree when discovered subsequent to graduation.***

*Assuming first offense
**Exam, quiz, tests, assignments or other course work.
***Applies to graduate students