

USC Viterbi School of Engineering

AME 341aL Mechoptronics Laboratory I

Units: 3

Term: Fall 2020

August 17th – November 13th

Lecture: MWF 8-9a Zoom
Lab: M, T, W or Th 2-5p Zoom+AnyDesk

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Office Hours: See Piazza

ASYNCHRONOUS AND SYNCHRONOUS LEARNING POLICY AND GUIDELINES

Lab sections will be **synchronous**, taking place from 2-5pm (Pacific Time; Los Angeles, CA) on your scheduled lab day. This means attendance and participation is required during your scheduled lab time. Lab sections will meet via Zoom, and for most experiments, a remote desktop software application (AnyDesk) will also be used so you can log into a computer station in the Mechoptronics Lab and conduct an experiment. AnyDesk access is restricted to your scheduled lab day and time. A stable internet connection is required. **Lecture** will take place at the scheduled times and Zoom recordings will be made available shortly after. Details regarding lab experiments and ensuing assignments will be discussed during lecture, before a given experiment. Hence, students will need to stay up to date with the lecture content in order to be prepared for lab. Lectures are nominally scheduled for MWF, but Friday sessions are typically held only after an assignment is submitted (see the “Recap” sessions on the Course Schedule).

Course Description

A coordinated laboratory and lecture sequence on aeromechanical instrumentation and device control stressing the symbolic integration of mechanical, optical and electronic components. This course is intended for junior level aerospace and mechanical engineering students, and is designed to develop self-sufficient, capable, and critically thinking engineers.

Learning Objectives

AME 341aL teaches the basics of aerospace and mechanical experimentation; this includes how to make a measurement, perform analysis, and report on technical findings. Laboratory experiments introduce the students to a variety of digital and analog measurement devices and often require the construction of basic circuits; the physical nature of these devices are presented during the lecture section, and the capabilities and limitations are explored during the laboratory section. Assignments focus on clarity in technical communication. Diligent data collection followed by detailed data analysis is required, where Matlab and MS-Excel computational methods are employed. The results are then communicated in a written technical format of publishable quality.

Prerequisite(s): MATH 126, PHYS 152

Co-Requisite (s): n/a

Concurrent Enrollment: n/a

Recommended Preparation: n/a

Course Content and Discussion Forum

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

Technological Proficiency and Software Required (download and install now)

Matlab: student license available at <http://software.usc.edu/>

MS-Office: student license available at <https://itservices.usc.edu/officestudents/>

AnyDesk: remote desktop software used during lab; download from <https://anydesk.com/en>

USC Technology Support Links: [Zoom information for students](#) and [Blackboard help for students](#)

Course Schedule

Wk	Date	Lecture # / Topics	Lab Contents	Assignment
1	M 8/17	(0) The Basic Ideas	(0) Introduction to Lab	
	W 8/19	(1) Technical Communication I		
2	M 8/24	(2) Error Analysis I	(1) Graphics/Word for Engineers	A0 Due
	W 8/26	(3) Error Analysis II		
3	M 8/31	(4) Error Analysis III	(2) Physical Measurements	A1 Due
	W 9/2	(5) Elements of Electronics		
	F 9/4	(6) <i>A1 Recap</i>		
4	M 9/7	No Lecture - Labor Day	NO LAB	A2 Due
	W 9/9	(7) Linear Circuits I		
	F 9/11	(8) Linear Circuits II		
5	M 9/14	(9) <i>A2 Recap</i>	(3) Linear Circuits	
	W 9/16	(10) Phasors and Complex Exponentials		
	F 9/18	(11) <i>E3 Recap / E4 Lab Prep</i>		
6	M 9/21	(12) 1st Order Systems I - Principles	(4) Real and Virtual Instruments (*half class)	A4 In-Lab Assignment
	W 9/23	(13) 1st Order Systems II - Practical examples		
7	M 9/28	(14) Op-Amps I - Steady state	(4) Real and Virtual Instruments (*half class)	A4 In-Lab Assignment
	W 9/30	(15) Op-Amps II - Frequency response		
	F 10/2	(16) <i>A4 Recap; E5 Lab Prep</i>		
8	M 10/5	(17) Op-Amps III	(5) Transfer Function of a 1st Order System	
	W 10/7	(18) Technical Communication II		
9	M 10/12	(19) Digital Circuits I - How to build a computer	(6) Properties of Op-Amps	A5 Due
	W 10/14	(20) Digital Circuits II - Analog-to-Digital converters		
	F 10/16	(21) <i>A5 Recap</i>		
10	M 10/19	(22) Digital Circuits III - Analysis of discrete signals	NO LAB	
	W 10/21	(23) Digital Signal Processing		
11	M 10/26	(24) Digital Signal Processing II	(7) Analysis of Discrete Time Series	A6 Due
	W 10/28	(25) What have we done?		
	F 10/30	(26) <i>A6 Recap</i>		
12	M 11/2	(27) What are we missing & what's next?	NO LAB	
	W 11/4	(28) Something fascinating		
13	M 11/9	(29) Something else fascinating	Lab Practical Exam	A7 Due
	F 11/13	(30) Course Summary/Results		

Required and Supplementary Materials

There are no "Required" text textbooks for AME 341aL. A course reader will be provided which includes background information related to the topics discussed during lecture and lab. The course reader supplements the topics covered in class; thus, by definition, it is not as detailed as the material presented during lecture and lab. There are several *optional* textbooks outlined below which supplement the content presented throughout the course:

(optional) Introduction to Mechatronics and Measurement Systems, Alciatore & Hstand (2011) McGraw-Hill.

(optional) Theory and Design for Mechanical Measurements, Figliola & Beasley (2010) Wiley.

(optional) The Art of Electronics, Horowitz & Hill (1989) Cambridge University Press.

Description and Assessment of Assignments

There will be one Lab Practical examination given on the last week of classes during your schedule lab day and time. The remainder of the course assignments will be based on experiments conducted in lab, and **several experiments have a Pre-Lab component which is due before the corresponding lab begins.** All assignments are typically due within one week, unless otherwise noted. All assignments will be produced using a technical report writing style, which will be detailed during lecture. Data analysis will be performed using Matlab and MS-Excel, as required.

Grading Breakdown

Subject to change; see Course Schedule.
Pre-Lab scores are distributed between primary Assignment and Professionalism categories.

Assignment	% of Grade
A0	2
A1	5
A2	10
A4	5
A5	12
A6	14
A7	17
Lab Practical	20
Professionalism	15
Total	100

Assignment Submission Policy

Most assignments are due **before** lab begins on your respective lab day, as specified at lab time or in class announcements. TurnItIn, accessed through the course Blackboard page, will be used for all submissions. Assignments must be uploaded on time. **A late assignment will be docked 50% and no assignment will be accepted after 8am on the day following the due date. One microsecond (1 μ s) late is considered late and there are no exceptions.** For similar reasons, there are no make-up labs. All labs and assignments will count towards the total grade (*i.e.*, none are dropped). Absences for medical reasons must be justified with some reasonable evidence. It is not possible to pass the course if you are missing multiple assignments or any labs.

Additional Policies

See the Mechoptronics course reader for all policies, codes of conduct, and expectations. Read that in full.

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* ([link](#)), 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 ([link](#)).

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* ([USC DPS](#)). 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

Counseling and Mental Health - (213) 740-9355 – 24/7 on call studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

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