USC Viterbi School of Engineering

AME 341aL Mechoptronics Laboratory

Units: 3

Term: Summer 2015 W July 1st – T August 11th

Location: Lecture T/Th 9-11a OHE 230
Lab W 9a-1p BHE 301
See course Blackboard page
http://software.usc.edu/ (install Matlab)

Instructor: Charles Radovich
Office: RRB 202
Office Hours: T 11a, W 2p, Th 11a (1 hour timeslots)
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Teaching Assistants: Jackson Petty and Stephen Rolfe
Office: BHE 301 BHE 301
Office Hours: TBD TBD
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Course Schedule: A Weekly Breakdown

Wk.	Date	(Lecture #) Topics Covered	Lab Assignment: Contents {Required}
1	W 7/1	(0) The Basic Ideas, Error Analysis I, Matlab (**OHE 230**)	A0: Hello (Graphical) World {Matlab}
	Th 7/2	(1) Error Analysis II	
2	T 7/7	(2) How to Communicate, MS-Word for Engineers	A1: Uncertainty analysis, Report (M&M, Results, Conclusion) {MS-Word equation editor}
	W 7/8	**LAB** - Blocks	
	Th 7/9	(3) Elements of Electronics, Linear Circuits I	
3	T 7/14	(4) Linear Circuits II	A2: Quantitative Reasoning
	W 7/15	**LAB** - Real and Virtual Instruments + Circuits	
	Th 7/16	(5) 1st Order Systems I	
4	T 7/21	(6) 1st Order Systems II, Matlab for Engineers	A3: Full Written Technical Report (Abstract, Intro, M&M, Results/Discussion, Conclusion) {Matlab}
	W 7/22	**LAB** - 1st Order Systems (RC Filters)	
	Th 7/23	(7) Digital Circuits, Digital Signal Processing I	
5	T 7/28	(8) Digital Signal Processing II	A4: Report (Results/Discussion) {Matlab}
	W 7/29	**LAB** - Signal Analysis	
	Th 7/30	(9) Op-Amps I	
6	T 8/4	(10) Op-Amps II, Excel for Engineers	A5: Spreadsheet Analysis (Results/Discussion, Conclusion) {MS-Excel}
	W 8/5	**LAB** - Operational Amplifiers	
	Th 8/6	(11) What have we done? Course Summary	
7	T 8/11	Lab Practical (**BHE 301**)	

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 Notes

AME 341aL relies heavily on the USC Blackboard webpage for all course communications. This includes Discussion Forums for assignments, course documents, and grade reporting. Before the semester begins, students should verify they have access to this webpage.

Technological Proficiency and Hardware/Software Required

Matlab (student license available at http://software.usc.edu/; also available in all USC computer labs as well as the Mechoptronics Lab BHE 301). Students need to stay connected to the course Blackboard webpage.

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, but note there are several copies available for reading in BHE 301 (these copies are to remain in the lab):

(optional) Introduction to Mechatronics and Measurement Systems, Alciatore & Histand (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 day of classes (Tuesday, August 11th). The remainder of the course assignments will be based on experiments conducted in lab (every Wednesday). 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.

Grading Breakdown

Assignment	% of Grade
A0	5
A1	11
A2	9
A3	19
A4	13
A5	13
Lab Practical Exam	25
Lab Performance	5
Total	**100**

Assignment Submission Policy

Each assignment is due within one week of the lab, **before** class begins, as specified at lab time or in class announcements. Physical documents must be handed in at the lab in BHE 301. They must be handed in on time. A late assignment will be docked 50% and no assignment will be accepted after 9am on the day following the due date. One microsecond (1 μs) late is considered late and there are no exceptions. For similar reasons, there are no make-up labs. All labs 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 two or more 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. Please 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/. 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.