AME 527

Department of Aerospace and Mechanical Engineering
University of Southern California

Course Syllabus

Spring 2017

AME 527
Elements of Vehicle and Energy Systems Design
Units: 3

Instructor: David S. Lazzara, Ph.D
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Office Hours: Tutor Hall (RTH) 109, Wednesdays 5:30pm–6:30pm

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Lecture Room: RTH 109 and DEN@Viterbi
Lecture Time: Wednesdays 6:40pm–9:20pm

Course Description

This course provides a comprehensive overview of principles related to engineering design and quantitative tools that can support the design process. Various topics are presented to summarize an organized approach to design problems with an emphasis on multidisciplinary design optimization (MDO) perspectives. The initial lectures provide a summary of design principles and problem formulation to help students recognize design opportunities and formulate design problems in an effective manner. The bulk of the remaining lectures focus on developing designs with various MDO methods, both rigorous and heuristic, that provide quantitative information for further design improvements. Students will exercise the learned material in homework assignments and a group design project to be presented at the end of the semester.

Assignments

Five homework assignments will be assigned throughout the semester and each will be due two weeks after they are assigned (see the Course Schedule for due-dates) by the start of lecture. Assignments should be submitted electronically in PDF format via the DEN Desire2Learn class website.

Group projects will be assigned early in the semester and each group will provide project updates throughout the term. Final group oral presentations will be presented at the end of the semester and each group will submit a formal written report. Both the presentation slides and written report should be submitted electronically in PDF format.

Grading

The grading scale is summarized as follows:

Assignment	Weighting
Total Homework	50%
Total Project Updates	5%
Final Written Report	25%
Final Oral Presentation	20%
Total	100%

Each homework assignment is weighted by 10%. The group project updates are required and graded. Late assignments will not be accepted. Extenuating circumstances must be discussed with the instructor prior to the assignment due-date if a student cannot submit their completed assignment on-time.

Course Schedule

Week #	Date	Lecture #	Material	Assigments Due
1	Jan. 11	1	Course Introduction; Design Principles	
2	Jan. 18	2	Geometry Management	
3	Jan. 25	3	Problem Formulation and Modeling	Homework 1
4	Feb. 1	4	Design Space Exploration	Group Update 1
5	Feb. 8	5	Numerical Optimization I	Homework 2
6	Feb. 15	6	Numerical Optimization II	
7	Feb. 22	7	Linear & Non-Linear Programs	Homework 3
8	Mar. 1	8	Gradients & Sensitivity Analysis	Group Update 2
9	Mar. 8	9	Heuristics I	Homework 4
10	Mar. 15	–	Spring Break (No class)	
11	Mar. 22	10	Heuristics II	Homework 5
12	Mar. 29	11	Post-Optimality Analysis	Group Update 3
13	Apr. 5	12	Multiobjective Optimization I	
14	Apr. 12	13	Multiobjective Optimization II	
15	Apr. 19	14	Approximation Methods	Final Report
16	Apr. 26	–	Final Presentations	Final Slides
17	May 3	–	Final Presentations	

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 527, 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 527 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 527 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 webpage `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.

Grade Definitions

The USC Office of Academic Records and Registrar provides the following grade definitions used in this course:

Grade	Definition
A	Work of **excellent** quality
B	Work of **good** quality
C	Work of **fair** quality for **undergraduate credit; minimium passing** for **graduate credit** (except in courses designated by a school or department to have a **higher** minimum standard for passing; see University Catalogue under individual program requirements.)
C minus	**Failing** grade for **graduate credit**