

**Spring 2008 EAS4710C Aerospace Design I**  
**EML4502C Mechanical Engineering Design I**  
**EGN4413C Interdisciplinary Design I**

### **Description:**

Continuation of the application of the design process in the team solution of a state-of-the-art problem. Aerospace, mechanical, thermo-fluid or material problems are considered. Working models are produced based on the design requirements established in Senior Design I.

### **Objectives:**

1. To present topics needed by a designer but not covered elsewhere
  - Robust design, decision theory, optimization.
  - Manufacturing processes, reliability.
  - Codes/standards, patents, litigation.
2. To foster awareness about different requirements during a design process
  - Requirement for / role of creativity.
  - Requirement for continuing study.
  - Role of ethics.
3. To provide experience in writing/speaking/communication

### **Overview:**

Subject material in this course will include the design process, as well as design projects of varying scales. In addition, the course will include material on selected subjects chosen to help round out and bring together the students knowledge. The course will place emphasis on initiative to develop definitions and formulate solution approaches. The course will rely on self-learning in manner which is expected in the work force. A large and long-term project (fall through spring) will be assigned to facilitate practical implementation of engineering design and the design process.

This course is intended to complete the students engineering education. Thus, upon completion of this course, the student must demonstrate:

- an ability to apply knowledge of mathematics, science and engineering;
- an ability to design systems, components and processes to meet desired needs;
- an ability to function in multi-disciplinary teams;
- an ability to identify, formulate and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively
- an ability to use the techniques, skill and modern engineering tools necessary for engineering practice;
- the ability to understand the impact of engineering solutions in a global and societal context; and
- knowledge of contemporary issues.

### **Prerequisites:**

EAS 4710: EAS 4700  
EML4502: EML 4501  
EGN4413: EGN 4412

**Instructors:****EML 4502C**

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**EAS 4710C/EGN 4413C**

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Office Hours: M, W 12:00-2:00 pm

**Text:**

Engineering Design by R. Eggert, Prentice Hall

**Projects:**

In Senior Design II, students are required to complete the detail design phase and build and test a prototype according to the design specifications selected in Senior Design I.

Both formal written and oral reports will be required as noted. Each individual student *must* maintain a design notebook (logbook), in which written records of all significant activities and events must be kept. These must be submitted upon the request of the instructor.

**Presentations:**

Each member from each team will be expected to give a progress report each week, as required by the instructor. Formal design reviews will be conducted as scheduled below. During formal reviews, each team will be limited to about 15-20 minutes, and each team member must participate.

**Reports:**

A formal written report must be presented for the Detailed Design, as noted below. The format to be followed will be provided later in class.

**Schedule:**

Class                      T, Th 7:30 – 10:20am

Laboratory periods will be used for team meetings, work sessions, design reviews and presentations.

Written Detail Design Report                      due Feb. 15

Oral presentation of Detail Design                      Feb. 5, 7, 12

Spring Break                      Mar. 10 - 15

Final Report/Prototype presentation                      Week of Apr. 7 or 14 (8,10, 15 or 17)

**Grades:**

Each of the following items will contribute to your final overall grade:

Written Detail Design Report                      20%

Oral presentation of Detail Design                      20%

Final Report/Prototype presentation                      20%

Weekly reports, presentations/*attendance*\*                      20%

Design Notebook                      20%

\* Attendance of each team member during weekly presentations to instructor is mandatory. The performance of a team as well as individual student’s contribution to the team project will be measured by reports, presentations, a prototype and peer evaluation.

## Class Participation

	A	B	C	D	F
Group Dynamics	<p>All members work productively together. Cordial resolution of any differences. All opinions are respected.</p>	<p>Group is productive, but one member is somewhat less effective (or perhaps less respected) than the others. Can be improved with instructor intervention/counseling, since oftentimes it's subtle and unintentional.</p>	<p>Group is still productive, but there is noticeable internal friction. Some backbiting, rude comments. Instructor intervention is usually not successful, except to reduce the more overt displays of discontent.</p>	<p>Group has significantly reduced productivity compared to their potential. Frequent bickering and disrespect. Members undo each others' work at extra sessions, when the originators aren't around. Often occurs if a co-worker relationship breaks up during the semester.</p>	<p>Dysfunctional, pathological group. Open hostilities, ganging up, shunning, "recorders" who just take notes, people who stare off into space, read E-mail, or work on other coursework. No tangible progress. Extremely rare.</p>
Personal Contribution (peer assessment)	<p>Equally conversant with all aspects of the project, even if specializing in one particular problem. Readily communicates knowledge to the rest of the group. Can accept ideas from others, as well as constructive criticism.</p>	<p>Knows all aspects of the project, but less able to share specialized knowledge. Still open to input from others, and not too critical of failures.</p>	<p>Knows a specialty adequately, but has little concern about what others are doing. Begins to blame others for failures. Mantras: "Hey, I'm just the mechanical guy" or "Hey, I'm just the code monkey."</p>	<p>Supposedly has specialized or accepted responsibility for a given task, but actually is clueless about how to do the job -- and won't give it up to someone else who <i>can</i> do it! Knows nothing about what others are doing. Mismatch between perceived and actual abilities.</p>	<p>Is just "there" occupying space-time and consuming oxygen. Might be writing very diligently in his design notebook, perhaps even making an excellent one, but is not helping the others in any tangible way. A tragic waste.</p>

## Design Notebook

	A	B	C	D	F
<b>Missing Dated Entries</b>	0	1	2	3	4+
<b>Format</b>	<p>Writing is clear and legible, no smearable pencil or ink. No loose sheets: all photos and code listings are taped/stapled/glued in. Notebook is well-organized with clear page layout. Dated entries are easy to find. All photos and drawings are labeled. All photos have good contrast, are in focus, and printed at large enough size to see the details. Data plots have appropriate axis tick spacing and labels. Good English grammar and spelling.</p>		<p>Handwriting is readable but could be improved. Some loose sheets. Photos too small and/or under-labeled, though usually the photos are of okay quality. Poor page layout. Data plots have absurd axis tick spacing (<i>i.e.</i>, whatever fractional default steps Excel happens to spit out), no axis labels, and illegible plot lines. Frequent misspellings of common course words ("axel", "obstical"). Some grammar and word choice errors ("it's" as a possessive). Can be improved by being more meticulous.</p>		<p>Illegible or undecipherable handwriting. Many loose pages (or no binder if electronic). Many too-small, out-of-focus, or poorly-contrasting photos. Many unlabelled figures. Data plots are illegible and uninformative. Full of typos and systematic misspellings. Very bad English grammar and usage. Grade-school quality. Unacceptable and unprofessional at the college level.</p>