MEC 440-441 in 2010-2011 Academic Year
(Fall 2010 and Spring 2011)

Instructor: Prof. Yu Zhou, 153 Light Engineering, 2-8322, yuzhou@notes.cc.sunysb.edu.
Machine shop manager: Mr. Lester Orlick, B014 Old Engineering, 2-8384, lorlick@ms.cc.sunysb.edu.
Client coordinator for assistive technology projects: Mr. Thomas Rosati, Premm Learning Center, (631) 567-4901, specialatp@aol.com, http://www.specialteaching.com/.

Class schedule:

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<tr>
<td>Class time: Tuesday &amp; Thursday, 6:50-8:10pm</td>
<td>Class time: 12:50-2:10pm</td>
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<td>Classroom: Melville Library W4550</td>
<td>Classroom: Earth &amp;Space 131</td>
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Course description:

This two-semester capstone design project sequence provides senior mechanical engineering undergraduate students with significant senior design experience to practice knowledge, motivate learning, prepare for their careers, collaborate, develop innovative techniques and serve the community.

Students will work in groups, designing and implementing their projects based on the total design methodology. The design process consists of the following major steps:

1. Teaming and project selection,
2. Market and user needs analysis,
3. Product design specification (PDS) initialization and updating,
4. Conceptual design,
5. Detail design,
6. Prototyping and testing.

The design process spans two semesters. The first semester will emphasize design and analysis. Students will go through the major design steps. By the end of the first semester, each team should generate a complete set of design details of the project, which is ready for fabrication. The second semester will emphasize implementation and testing. Students will fabricate and refine their prototypes, based on testing, to realize proposed functions.

To fulfill the course requirement, each design team needs to submit
1. The project proposal after choosing the project,
2. The first progress report after market and user needs analysis and PDS initialization,
3. The second progress report for conceptual design,
4. The third progress report for detail design,
5. The fourth progress report for prototyping and testing,
6. The final report.

Moreover, at the end of the first semester, each team needs to give an oral presentation of their design steps and results; and at the end of the second semester, each team needs to give an oral presentation of their design and implementation process, and demonstrate their prototype.

Prerequisites: MEC 300, 310, 317, 320, and 326; MEC major; U4 standing.
Corequisites: MEC 410 and 411
Textbook: No textbook is required for this class.

Rules:
1. The design project should be a team work. Each design team should consist of 2-3 people based on the need of the chosen project, with 3 people highly suggested. No single-person team is allowed.
2. Each team should choose an advisor among the faculty, and maintain a regular meeting with the advisor based on a schedule discussed between the team and advisor.
3. Each team should schedule one meeting with the machinists in each design phase, including project selection, conceptual design and detail design, to discuss about the feasibility of their project, and work under the machinists’ advice during the phase of prototyping.
4. Each team should meet the instructor to discuss about their progress and get advice based on a pre-determined schedule.

Due dates: The due dates of progress reports must be obeyed so that no delay is caused in not only your project but also to the whole class. The submission must be made by the midnight on each due date with the appropriate electronic file (Word for reports and Powerpoint for presentations) uploaded to the Digital Dropbox on the Blackboard.

I. Fall semester
1. Teaming information: 09/07/2010 (Tuesday) (If you cannot find a team to join by the deadline, the instructor will assign you a team, and you will have no choice.)
2. Project proposal (project selection, timeline, budget, member responsibility): 09/23/2010 (Thursday)
3. Progress report 1 (market and user needs analysis, PDS): 10/14/2010 (Thursday)
5. Progress report 3 (detail design): 12/09/2010 (Thursday)

II. Spring semester
1. Progress report 4 (prototyping): 03/31/2011 (Thursday)
2. Final report and project summary: 05/10/2011 (Tuesday)

Grading: The letter grade will be issued at the end of the spring semester. The fall and spring semesters will have the same grade. Each team has 100 points. A(100-94), A-(93-90), B+(89-87), B(86-82), B-(81-79), C+(78-76), C(75-72), C-(71-68), D+(67-64), D(63-60), F(59 or below). The following is the breakdown.

1. Reports 66%
   • The first semester
     1) Project proposal 3%
     2) Progress report 1 (market/user needs analysis) 5%
     3) Progress report 2 (conceptual design) 5%
     4) Semester report (market/user needs analysis, conceptual design and detail design) 20%
     5) Semester presentation 4%
   • The second semester
     1) Midterm progress report 5%
     2) Final report 20%
     3) Final presentation 4%
     2. Final prototype 30%
3. Machine shop performance 2%
4. Participation in URECA and other course-related events: 2%.

- In order to get a valid grade, a working prototype must be finished. If the prototype is not finished, no grade will be given to the team. If your project is under external funding, you should be responsible to the project requirements.
- Each report will be submitted and graded on a team basis. Late submission of your report will cost 5% of that report per calendar day, and will not be accepted with a delay of 3 or more days.
- The grade for each student will be adjusted on the basis of his/her team score according to his/her contribution to the project. If any member cannot sufficiently participate in the project team activity, no grade will be given to him/her.
- The final report will be graded by both the instructor and the project advisor. The two grades will be averaged for the final report. It is your responsibility to make sure that you submit your final report to your project advisor by the deadline.
- Bonus points: If the project wins an award in a university-level competition within the course period, your grade will be moved up 5%; if the project wins any nation-wide or international competition within the course period, your grade will be moved up 7%. If you publish a paper based on your project (submit a publishable manuscript with the instructor and advisors) within the course period, your grade will be moved up 5%.

Project budget and reimbursement policy:
1. The budget of each project (team) should be less than or equal to $170×Number of members.
2. The reimbursement of project related purchase covers only materials and components.
3. Reimbursement can be requested at any time during the design and prototyping process.
4. The last day of requesting reimbursement will be 05/15/2011.
5. To request a reimbursement, you need to fill up a purchase form (get it from the department office LE113), attach original receipts (if paid by a credit card, attach the credit card statement), let the instructor sign it, and submit it to the department office.
6. Sales tax will not be reimbursed.

Student outcomes (SOs) of this course:
(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
(l) an ability to apply the principles of mathematics through multivariate calculus and differential equations
(m) an ability to model, analyze, design and realize physical systems, components, or processes
(n) an ability to work professionally in both thermal and mechanical systems areas

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<th>Course Learning Objectives</th>
<th>SOs</th>
<th>Assessment Tools</th>
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<tr>
<td>Learn to identify, formulate and solve engineering problems when developing design proposal, defining product design specifications (PDS), and generating design solutions based on PDS.</td>
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<td>Reports and presentations</td>
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<td>Clearly identify the needs and then follow the total design approach to design and realize a device or system to meet the stated needs.</td>
<td>c,m</td>
<td>Reports and presentations</td>
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<td>Interact with a client or client coordinator to make sure that the design solutions will meet the needs; work with students from other departments to form joint design team; combine the knowledge of mechanics, electronics and computing into the design solutions.</td>
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<td>Reports and presentations</td>
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<td>Define individual professional responsibility for the project.</td>
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<td>Reports and presentations</td>
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<td>Conduct design analysis by applying appropriate knowledge that students have learned to the specific project that they are involved with.</td>
<td>a</td>
<td>Reports and presentations</td>
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<td>Conduct experiments and analyze the data based on the requirements of the specific project.</td>
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<td>Reports and presentations</td>
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<td>Learn things that have not been taught in the classroom but are required for the project.</td>
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<td>Reports and presentations</td>
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<td>Learn contemporary issues related to the project through background search.</td>
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<td>Reports and presentations</td>
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<td>Use CAD/CAM software, CNC machines, rapid prototyping machines and other modern engineering techniques and skills to implement the project.</td>
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<td>Reports and presentations</td>
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<td>Prepare design reports and give oral presentations with visualized materials.</td>
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<td>Reports and presentations</td>
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<td>Gain a better appreciation of how engineering solutions can have impact on the society and people’s lives.</td>
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<td>Reports, presentations and advising meetings</td>
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**Americans with Disabilities Act**
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students requiring emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information, go to the following web site http://www.ehs.sunysb.edu/fire/disabilities/asp.

**Statement on Academic Dishonesty**
Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work that is not originally yours. Examples include, but are not limited to, copying or plagiarizing class assignments including homework, reports, designs, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids, either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted to the fullest via the CEAS CASA committee. For you, the honest student, academic dishonesty results in lower class curves, hence a depression in your GPA and class standing, while cheapening the degree you earn.