Engineering 460 – Spring 2016
Engineering Capstone Design
Department of Physics and Astronomy, Stephen F. Austin State University

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Office Hours: MW [10AM - 1PM], T [9-10AM 11-12PM 2-3PM], R [9-11AM], or by appointment
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Class Meetings: MW 10:00-10:50 PM, Room 318 Miller Science Building
Course Home Page: http://d2l.sfasu.edu

Course Description:
A capstone design project is taken up to the point of prototype construction, testing and hardware specification. The specific skills and knowledge needed by practicing engineers in the product realization process are emphasized and developed. Prerequisite: 12 semester hours of engineering or physics.

Text and Materials:
None required, although the following text will be referred to throughout the course: Engineering Design, Dieter & Schmidt, Pearson, 5th ed. (ISBN-13: 978-0073398143)

Course Requirements:
Each team is required to maintain a bound notebook. The pages in the notebook must be numbered and the date and time of specific entries should be written at the top of each page. All calculations must be done in this notebook. Also include drawings, schematics, and anything pertinent to the project design as shown in class.

Course Calendar:
Calendar is tentative and subject to change depending on pace of the class.

<table>
<thead>
<tr>
<th>Week</th>
<th>Class Dates</th>
<th>M W</th>
<th>Topic</th>
<th>Important Dates</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>MLK</td>
<td>1/20/16</td>
<td>Team forming, Engineering design introduction</td>
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<td>2</td>
<td>1/25/16</td>
<td>1/27/16</td>
<td>&quot;Define Problem&quot; - Project selection, Team roles</td>
<td>Project proposal due 1/29 (Friday)</td>
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<tr>
<td>3</td>
<td>2/1/16</td>
<td>2/3/16</td>
<td>&quot;Gather Information&quot; - Internet, Patents, Journals, etc.</td>
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<td>4</td>
<td>2/8/16</td>
<td>2/10/16</td>
<td>&quot;Concept Generation&quot; - Brainstorming, Systematic design</td>
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<td>5</td>
<td>2/15/16</td>
<td>2/17/16</td>
<td>&quot;Evaluate &amp; Select Concept&quot; - Decision making</td>
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<td>6</td>
<td>2/22/16</td>
<td>2/24/16</td>
<td>Conceptual design review</td>
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<td>7</td>
<td>2/29/16</td>
<td>3/2/16</td>
<td>Embodiment design</td>
<td>Conceptual Design report due 2/29</td>
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<td>8</td>
<td>3/7/16</td>
<td>3/9/16</td>
<td>Detail design</td>
<td>Conceptual Design presentation 3/10</td>
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<td>Spring Break</td>
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<td>Engineering drawings, CAD/CAM, FEA</td>
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<td>10</td>
<td>Easter</td>
<td>3/30/16</td>
<td>&quot;Configuration Design&quot; - Material selection, Manufacturing</td>
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<td>11</td>
<td>4/4/16</td>
<td>4/6/16</td>
<td>&quot;Parametric Design&quot; - Tolerances, DFM, DFA, DFE</td>
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<td>12</td>
<td>4/11/16</td>
<td>4/13/16</td>
<td>Economic Decision making, Cost evaluation</td>
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<td>13</td>
<td>4/18/16</td>
<td>4/20/16</td>
<td>Legal and ethical issues in engineering design</td>
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<td>14</td>
<td>4/25/16</td>
<td>4/27/16</td>
<td>Embodiment and Detail design review</td>
<td>Prototype demonstration 4/27</td>
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<tr>
<td>15</td>
<td>5/2/16</td>
<td>5/4/16</td>
<td>Course review, Prototype updates</td>
<td>Detailed Design report due 5/4, Detailed Design Presentation 5/5</td>
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Grading Policy:
Conceptual Design Report (20%)
Conceptual Design Presentation (15%)
Detailed Design Report (20%)
Detailed Design Presentation (15%)
Notebook, Class exercises, Peer Review (30%)

Letter grades are based on the following ranges:
A: 90.0 – 100, B: 80.0 - 89.9, C: 70.0 - 79.9, D: 60.0 - 69.9, F: 0 - 59.9.

Student grading for submitted work will be judged by if the work is neat, complete, and organized. Quantity of submissions for work will also be used to grade relative to other students in the group. Therefore it is required that any information a student generates for the project (tables, graphs, PowerPoint slides, etc.) should be accompanied by the initials of the student. If multiple students work on a single task then list them as well. For instance, if one student is in charge of taking meeting minutes, then record that student’s initials in a “recorded by:” label on the minutes page. Further details on required work in the notebook as well as project reports will be given in class.

Grading for presentations will be based partially on written comments by invited faculty. Presentations are tentatively scheduled during the 4:00 – 4:50 pm time slot on Thursdays reserved for seminar (dates shown on the course calendar). Each presentation should be between 20 to 25 minutes and will require all members of the team to speak. Organization of the presentation will be at the discretion of the students. Practice presentations may be required by the instructor prior to the scheduled time for the talk.

A portion of the grade will be based on peer review as outlined above. Peer reviews will be anonymous to the rest of the team. This metric is included to encourage all team members to contribute to the project. Severe instances of student non-participation will be dealt with on a case-by-case basis.

Attendance Policy:
Attendance will be taken at the beginning of each class. If you have 3 unexcused absences, then your final grade will be reduced by one letter grade. If you have 4 unexcused absences, you will receive an “F” in the course. To receive an excused absence a written and signed notice is required within three class days of the absence. If you miss class without approval of your instructor you will receive a grade of zero on the missed assignment. Authorized absences must be approved by your instructor in advance of the absence unless you have an emergency or illness. Make-up work must be completed outside of normal class hours and within one week following an excused absence. It is your responsibility to see your instructor and make arrangements for make-up work.

ABET a-k Student Outcomes
In this course we will address the following a-k student learning objectives as outlined at www.abet.org:
(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.
Program Learning Outcomes (PLO)
1. The student will demonstrate proficiency in the basic and applied fields of engineering.
2. The student will apply physical principles to novel situations, both in the classroom and in research settings.
3. The student will develop good experimental technique, including proper setup and care of equipment, conducting experiments and analyzing results in order to observe physical phenomena, assess experimental uncertainty, and make meaningful comparisons between experiment and theory.
4. The student will develop effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.
5. The student will be able to work effectively in groups or teams.
6. The student will appreciate the importance and practice of ethics in science.

Student Learning Outcomes (SLO)
By the end of the course, a successful student will be able to:
- Conceive and design components, systems and/or processes that will meet customer requirements for performance, cost, time, safety and/or quality. (PLO 2)
- Select appropriate components, materials and manufacturing processes to fabricate specified system components. (PLO 3)
- Perform effectively as a design team member and to contribute substantially to the success of the project. (PLO 5)
- Effectively communicate project objectives, feasibility analysis, design criteria, and hardware specifications both in oral presentations and in a comprehensive written engineering report. (PLO 4)

General Education Core Curriculum Objectives/Outcomes (EEO)
There are no specific general education core curriculum objectives in this course. This course is not a general education core curriculum course.
Academic Integrity (A-9.1)
Collaboration on examinations, in class assignments, and homework assignments is forbidden except where specifically specified as "Team" activities. For example, homework assignments can be worked on as a team but must be completed separately. In general, one team may not collaborate with another team on "Team" activities. Students violating this policy will be subject to procedures described in the Stephen F. Austin State University Policies and Procedures Manual.

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades - Semester Grades Policy (A-54)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Student Code of Conduct: Policy 10.4
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program. Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This policy applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the iCare: Early Alert Program at SFA. Information regarding the iCare program is found at https://www.sfasu.edu/judicial/earlyalert.asp or call the office at 936-468-2703.