Course Description:
Two semester hours. The capstone project initiated in EGR 460 is taken from a prototype to a finished project. The project then undergoes laboratory testing and evaluation. Students present their results on a research poster and in oral presentations. Prerequisite: EGR 460.

Prerequisites: EGR 460  Co-Requisites: None

Credits: 2 Hours  (Lecture: 2 Hours)

Instructor: Christopher J. Aul

Textbook: None required

Supplemental Materials: None required

Topics Covered:
Prototype construction and experimental testing, problem solving and teamwork skills, Information gathering techniques, failure modes and effect analysis, tolerances in design, engineering ethics, computer aided design and engineering, prototyping methods.

Student Learning Outcomes (CLOs for ABET)
By the end of the course, a successful student will be able to:
1. Demonstrate knowledge for engineering codes governing detailed design. (SO-7)
2. Create a final detailed design from a concept and give ideal methods for widespread application for design in current market. (SO-2)
3. Develop engineering tests for prototype and incorporate findings into final design. (SO-6)
4. Show knowledge of current design methods and apply those to engineering design. (SO-4)
5. Show how final design can be marketed and utilized in society. (SO-4)
6. Show understanding of ethical responsibilities of an engineer in use of final design. (SO-4)
7. Collaborate with engineers from other disciplines to develop a detailed design from a concept. (SO-5)
8. Present technical information to others. (SO-3)
9. Demonstrate skill in computer aided engineering software to produce engineering drawings. (SO-2)

Program Learning Outcomes (SOs for ABET)
Graduates of the program will show:
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
Course Outline:
Engineering 470 – Spring 2019
Engineering Capstone Design II
Department of Physics, Engineering, and Astronomy; Stephen F. Austin State University

Instructor: Christopher J. Aul, PhD
Email: aulcj@sfasu.edu
Office: 207D Ed & Gwen Cole STEM Building
Phone: 936-468-1512
Office Hours: MW 8-11am, TR 10-11am, or by appointment
Class Meetings: TR 12:30-1:20pm, Room 306 Ed & Gwen Cole STEM Building
Course Home Page: http://d2l.sfasu.edu

Course Description:
The capstone project initiated in EGR 460 is taken from a prototype to a finished project. The project then undergoes laboratory testing and evaluation. Students present their results on a research poster and in oral presentations. Prerequisite: EGR 460.

Text and Materials (Recommended):

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

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<thead>
<tr>
<th>Week</th>
<th>Class Dates</th>
<th>Topic</th>
<th>Important Dates</th>
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<tr>
<td>1</td>
<td>1/22/19</td>
<td>Topics Review, Project Updates, Review PDS</td>
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<td>1/29/19</td>
<td>BOM, Make vs. Buy</td>
<td>1/31 - Updated PDS Due</td>
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<td>3</td>
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<td>Prototyping: Drawings &amp; Tolerances</td>
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<td>2/12/19</td>
<td>Prototyping: Engineering Testing</td>
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<td>2/19/19</td>
<td>DFM/DFA</td>
<td>2/21 - Test Plan Due</td>
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<td>6</td>
<td>2/26/19</td>
<td>Reliability and safety in design, FMEA</td>
<td>2/28 - Notebook Check (NC)</td>
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<td>7</td>
<td>3/5/19</td>
<td>Prototype Fabrication: Finalize drawings</td>
<td>3/5 - Drawings Due</td>
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<td>3/7/19</td>
<td><strong>MARCH 8 SPRING MEETING – REQUIRED</strong></td>
<td>3/8 - Presentation Due</td>
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<td>3/12/19</td>
<td>Design Presentation to Panel</td>
<td>3/12 &amp; 3/14 - Present to Panel</td>
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<td>3/19/19</td>
<td><strong>Spring Break</strong></td>
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<td>3/26/19</td>
<td>Prototype Rework: Incorporate changes from panel</td>
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<td>10</td>
<td>4/2/19</td>
<td>Application of Design in Current Market</td>
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<td>4/9/19</td>
<td>Engineering Ethics in Design, NSPE Code of Ethics</td>
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<td>4/16/19</td>
<td>Prototype Testing</td>
<td>4/16 - Final Report Draft &amp; NC</td>
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<td>4/23/19</td>
<td>Design Review: Drawings and Prototype</td>
<td>4/25 - Final Drawings Due</td>
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<td>4/30/19</td>
<td>Design Review: Final Testing</td>
<td>5/3 - Presentation Due</td>
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<td>5/7/19</td>
<td>Final Design Presentation to Panel</td>
<td>5/7 &amp; 5/9 - Present to Panel</td>
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<td>5/10/19</td>
<td>5/10 - Final Report &amp; Notebook</td>
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C. Aul
**Grading Policy:**
Final Engineering Drawings & Prototype (10%)
First Design Presentation (10%)
Final Design Presentation (10%)
Detail Design Report (20%)
Course Exercises (20%)
Digital Notebook, 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. Each presentation 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.

**Course Requirements:**
Each person is required to maintain a digital notebook. The pages in the notebook must be numbered and the date and time of specific entries should be noted 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.

**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.

**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](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/](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](https://www.sfasu.edu/judicial/earlyalert.asp) or call the office at 936-468-2703.