Course Description:
Students will utilize computer-aided engineering (CAE) to understand concepts in geometric modeling and engineering graphics with applications to mechanical design. Topics will include fundamentals of design; modeling visualization and preparation of engineering drawings including multiview 3-D representations: orthographic projection and isometric perspective; solid modeling; dimensioning and tolerancing; modern prototyping and manufacturing techniques.

Prerequisites: EGR 111
Co-Requisites: None

Credits: 3 Hours (Lecture: 3 Hours)

Instructor: Christopher J. Aul

Textbook: Introduction to Solid Modeling Using Solidworks 2017
W. E. Howard & J. C. Musto
McGraw-Hill Education
ISBN: 978-1-259-69654-1

Supplemental Materials: None

Topics Covered:
Fundamentals of design; modeling visualization and preparation of engineering drawings including multiview 3-D representations: orthographic projection and isometric perspective; solid modeling; dimensioning and tolerancing; modern prototyping and manufacturing techniques.

Course Learning Outcomes
By the end of the course, a successful student will be able to:
1. Apply skills in software designed for computer-aided design (CAD) and computer-aided engineering (CAE) to (SO-k):
   a. Create a 2D representation of a 3D model
   b. Detail a CAD drawing with appropriate dimensions and tolerances
   c. Create a 3D model with a standard set of 2D representations (a sketch)
   d. Combine multiple objects into an assembly
   e. Simulate mechanical motion of an assembly to illustrate design intent
2. Analyze an existing engineering design to (SO-b):
   a. Identify design intent of each component in a complex assembly
   b. Measure components to recreate engineering design in a CAE environment
   c. Determine materials used in existing design and estimate physical properties
   d. Find potential for design improvements in existing design
3. Improve, change, or add new function to the design intent of an existing design to (SO-c):
   a. Create a new CAD model to illustrate improvement/change
   b. Test new CAD model for effectiveness
   c. Outline new CAD model and its performance in a technical report
4. Present technical information on CAD/CAE design to others (SO-g)
5. Show how engineering design can impact society, environment, and economy (SO-h)
Student Outcomes
Graduates of the program will exhibit:
(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
Engineering 210.001 – Spring 2018
Geometric Modeling for Mechanical Design
Department of Physics and Astronomy, Stephen F. Austin State University

Instructor: Christopher J. Aul, PhD
Office: 322E Miller Science
Email: aulcj@sfasu.edu
Phone: 936-468-1512
Office Hours: 8-10am Monday through Thursday, or by appointment
Class Meetings: TR 12:30-1:45pm, Room 358 Mathematics Building
Course Home Page: http://d2l.sfasu.edu
Prerequisites: EGR 111

Course Description:
Students will utilize computer-aided engineering (CAE) to understand concepts in geometric modeling and engineering graphics with applications to mechanical design. Topics will include fundamentals of design; modeling visualization and preparation of engineering drawings including multiview 3-D representations: orthographic projection and isometric perspective; solid modeling; dimensioning and tolerancing; modern prototyping and manufacturing techniques.

Text and Materials:

I will be assigning homework directly from the text so it is important that you obtain a copy of this edition. You do not have to obtain any online materials.

Grading Policy:

Initial Design Exam 15%
Detailed Design Exam 15%
New Model Design Exam 15%
In-class Assignments 20%
Homework Assignments 15%
Final Presentation 20%

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 < 60.0%

Exams:
The three exams in this course will be “take home” and consist of detailed instructions from the professor. The tentative due dates for these exams are shown in the course outline. A grading rubric will be provided and the exams should be constructed in a report-style format. Due to the nature of take-home exams there will be no make-up exams given. Late exams will be accepted with a penalty of 20% for each day the exam is late (i.e. if the exam is turned in two days late the maximum possible score the student could attain is 60 points out of 100). This penalty is increased to 50% for the New Model Design Exam due during the final exam time for this course (see calendar).
Course Calendar:

<table>
<thead>
<tr>
<th>Week</th>
<th>Class Dates</th>
<th>Topic</th>
<th>Text Chp</th>
<th>Important Dates</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1/16/17</td>
<td>1/18/17</td>
<td>Intro to Design using Solidworks (SW)</td>
<td>1</td>
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<tr>
<td>2</td>
<td>1/23/17</td>
<td>1/25/17</td>
<td>Design Basics, Measuring Instruments, CAE Techniques</td>
<td>1</td>
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<tr>
<td>3</td>
<td>1/30/17</td>
<td>2/1/17</td>
<td>Additional CAE Techniques in SW</td>
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<tr>
<td>4</td>
<td>2/6/17</td>
<td>2/8/17</td>
<td>Advanced Modeling in SW, Technical Report Writing</td>
<td>4</td>
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<tr>
<td>5</td>
<td>2/13/17</td>
<td>2/15/17</td>
<td>Parametric Modeling in SW</td>
<td>5</td>
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<tr>
<td>6</td>
<td>2/20/17</td>
<td>2/22/17</td>
<td>Assembly Models, Mating in SW, Exploded Views</td>
<td>6</td>
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<tr>
<td>7</td>
<td>2/27/17</td>
<td>3/1/17</td>
<td>Advanced Assembly Options, Interference and Collision</td>
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<td>8</td>
<td>3/6/17</td>
<td>3/8/17</td>
<td>Engineering Drawings, Dimensioning &amp; Tolerancing</td>
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<td></td>
<td>3/13/17</td>
<td>3/15/17</td>
<td>Spring Break</td>
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<td>9</td>
<td>3/20/17</td>
<td>3/22/17</td>
<td>Assembly Drawings, BOM</td>
<td>8</td>
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<tr>
<td>11</td>
<td>4/3/17</td>
<td>4/5/17</td>
<td>Simulation Techniques</td>
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<td>12</td>
<td>4/10/17</td>
<td>4/12/17</td>
<td>Molds and Sheet Metal Design, Prototyping Methods</td>
<td>12</td>
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<tr>
<td>13</td>
<td>4/17/17</td>
<td>4/19/17</td>
<td>Basic Static Analysis using SOLIDWORKS</td>
<td>13</td>
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<tr>
<td>14</td>
<td>4/24/17</td>
<td>4/26/17</td>
<td>Advanced Simulation using SW</td>
<td></td>
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<tr>
<td>15</td>
<td>5/1/17</td>
<td>5/3/17</td>
<td>Final Presentations during Class</td>
<td></td>
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<tr>
<td></td>
<td>5/10/17</td>
<td></td>
<td>New Model Design Exam Due by 1pm on 5/10</td>
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In-Class Assignments:
The course will largely be software based using SolidWorks 2017. I will assign work to be completed within the class time using this software. I will also give in-class quizzes to be completed within the time of the class. The quizzes will be over material covered and may be closed-note and closed-book. See the Attendance Policy for rules on missing work due to absence. The grading for in-class assignments and quizzes will be averaged for 20% of your final grade. Details for in-class assignments and quizzes will be reviewed in class.

Final Presentation:
Your “Final Exam” of sorts will be an in-class presentation of your design at the end of the semester. Details for what is required in the final presentation will be given in class. Tentatively the presentation will be on the order of 10 minutes and will include a PowerPoint presentation with images explaining your final design. It is the goal of the presentation to assess CLO 4 for this course. Pertinent training for technical presentations will be given 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.
Course Learning Outcomes (CLOs):
By the end of the course, a successful student will be able to:

1. Apply skills in software designed for computer-aided design (CAD) and computer-aided engineering (CAE) to:
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   c. Outline new CAD model and its performance in a technical report

4. Present technical information on CAD/CAE design to others

5. Show how engineering design can impact society, environment, and economy

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.