Solid Modeling and Finite Elements

COURSE DESCRIPTION
Success in global competition requires engineers to continually diminish the product design and development cycle time. Computers are used to improve the productivity of the design and development process. Today, computers are used to model, analyze, optimize, and document designs. This process is referred to as Computer Aided Design (CAD). The basic goal of this course is to present the fundamentals of Solid Modeling and its application

Learning Objectives

1. To learn about the basic concept of geometric modeling.
2. To learn about the basics of parametric line and curve theory.
3. To understand and draw Hermite and Bezier Spline curves.
4. To learn about 3-dimensional surface theories
5. To learn about the basics of Finite Element Modeling and Analysis
6. To learn about mesh generation
7. To learn about matrix notion for FEM
8. To learn about stiffness method
9. To learn about Truss Equations
10. To learn about rapid prototyping
11. To perform mechanical design and validation by ALGOR Design Software

Major Course Requirements

Homework (10%): To review and understand concepts or lessons in each chapter
Quiz 1 (5%): To prepare for the first midterm test
Test 1(15%): First midterm test to examine the level of understanding for the first half of the learning objectives
Quiz 2 (5%): To prepare for the second midterm test
Test 2 (15%): Second midterm test to examine the level of understanding for the second half of the learning objectives
Project (20%): FEM Project
Final (30%): Comprehensive measure of entire scope of learning objectives

Total (100%)

Required or Recommended Readings

Textbook:
Recommended Readings:


State Adopted Proficiencies/TExES competencies (COE)

CLASS POLICIES

Attendance: I will not take attendance after the beginning of the semester. I expect all students to attend all classes and arrive on time. Late homework will only be accepted for cause; death in family, car accident, hospitalized, doctor appointments, etc. Homework will be accepted if it is placed in my mailbox or e-mailed to me by the due date.

Late work and Make-up Exams

Late work is not going to be accepted. Make-up Exams are only arranged with 1 week prior notice. No make-up exam will be arranged after each exam.

Student collaboration: I strongly encourage collaboration on homework. It will help many of you to understand the ideas better if you explain them to each other. Collaboration to understand problems and concepts is how best to succeed in the “working world

Homework and Exam should be submitted in an organized and neatly presented form. Circle or box the answers to each problem. Appropriate units must be included on all answers. All calculations need to be on an engineers pad. At the top of each page of homework write your name, the course number, the assignment number, and date. Pages are to be numbered and stapled.

Extra Credit: Extra Credit questions/problems will be in some of the tests and homework.

Cell phone/Electronic Device Usage: Neither cell phone nor electronic devices are allowed in the class as well as in the laboratory. Students are required to turn off cell phone and Electronic Devices before the class starts.

Academic Integrity/Plagiarism.

University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in class failure.
Dropping a Class

I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. (4/12/13) is the last day to drop a class with an automatic grade of “W” this term.

Preferred methods of scholarly citations

Classroom/professional behavior

Grade Appeals*

As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

Disabilities Accommodations*

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Driftwood 101.

Syllabus

1. Introduction to CAD

(1/13, 18)
<table>
<thead>
<tr>
<th></th>
<th>Course</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Geometric modeling</td>
<td>(1/20, 25)</td>
</tr>
<tr>
<td>3</td>
<td>Curve theory</td>
<td>(2/1, 3, 8, 10)</td>
</tr>
<tr>
<td>4</td>
<td>Midterm Exam #1</td>
<td>(2/15)</td>
</tr>
<tr>
<td>5</td>
<td>Surface theories</td>
<td>(2/17, 22)</td>
</tr>
<tr>
<td>6</td>
<td>Introduction to FEM</td>
<td>(2/24)</td>
</tr>
<tr>
<td>7</td>
<td>Mesh generation</td>
<td>(3/31, 4/5)</td>
</tr>
<tr>
<td>8</td>
<td>Stiffness method</td>
<td>(3/1, 3, 8)</td>
</tr>
<tr>
<td>9</td>
<td>Spring break</td>
<td>(3/21-25)</td>
</tr>
<tr>
<td>10</td>
<td>Midterm Exam #2</td>
<td>(3/29)</td>
</tr>
<tr>
<td>11</td>
<td>Truss equation</td>
<td>(3/10, 15, 17)</td>
</tr>
<tr>
<td>12</td>
<td>Algor program for truss analysis</td>
<td>(3/7, 12, 14)</td>
</tr>
<tr>
<td>13</td>
<td>Rapid prototyping</td>
<td>(4/19, 21, 26, 28)</td>
</tr>
<tr>
<td>14</td>
<td>Final Exam</td>
<td>(?)</td>
</tr>
</tbody>
</table>