Solid Modeling and Finite Elements ENTC 3455  
Department of Engineering and Computing Sciences  
Spring 2017

A. COURSE INFORMATION
Course number/section: ENTC 3455/001  
Class meeting time: MW 05:00-05:50PM (Lec), MW 06:00-7:30PM (Lab)  
Class location: EN214 (Lec), EN214 (Lab)  
Course Website:

B. INSTRUCTOR INFORMATION
Instructor: Dugan Um  
Office location: EN 222C  
Office hours: MTWH 9AM – 12PM  
Telephone: 361-825-3381  
e-mail: dugan.um@tamucc.edu  
Appointments: by phone or email

C. COURSE DESCRIPTION
Stress analysis of deformable bodies and mechanical elements; stress transformation; combined loading; failure modes; material failure theories; fracture and fatigue; deflections and column instabilities; thick cylinders; curved beams; design of structural/mechanical members; design processes.

D. PREREQUISITES AND COREQUISITES
ENGR3320

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
Textbook: Solid Modeling and Applications: Rapid prototyping, CAD and CAE Theory, by Dugan Um, Springer  
ISBN 978-3-319-21822-9

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT
Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below.

By the end of this course, students should be able to:
1. explain basic concept of geometric modeling.
2. describe basics of parametric line theory.
3. describe Hermite and Bezier Spline curves theories.
4. describe 3-dimensional surface theories
5. perform Finite Element Modeling and Analysis
6. explain rapid prototyping
7. perform mechanical design and validation by Design Software

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Face to face lecture and project based laboratory

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Test #1</td>
<td>20%</td>
</tr>
<tr>
<td>Test #2</td>
<td>20%</td>
</tr>
<tr>
<td>Project</td>
<td></td>
</tr>
<tr>
<td>Ethical issues in Engineering: 10%</td>
<td></td>
</tr>
<tr>
<td>Lab part</td>
<td></td>
</tr>
<tr>
<td>Lab 1 (ABET a, d): 20%</td>
<td></td>
</tr>
<tr>
<td>Lab 2</td>
<td></td>
</tr>
<tr>
<td>Presentation: 20% (ABET g)</td>
<td></td>
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<tr>
<td>Report: 20% (ABET g)</td>
<td></td>
</tr>
<tr>
<td>Lab 3 (ABET a, k): Final project report: 30%</td>
<td></td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/20, 25</td>
<td>Introduction to CAD</td>
<td>1</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>1/27, 2/1</td>
<td>Geometric modeling</td>
<td>3</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>2/3, 8, 10, 15</td>
<td>Curve theory</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2/17</td>
<td>Midterm Exam #1</td>
<td></td>
<td>TBA in the class</td>
</tr>
<tr>
<td>2/22, 24</td>
<td>Surface theories</td>
<td>4</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>2/29, 3/2</td>
<td>Introduction to FEM</td>
<td>8</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>3/7, 3/9</td>
<td>Mesh generation</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>3/21, 23, 28</td>
<td>Stiffness method</td>
<td>8</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>3/30, 4/4, 6</td>
<td>Truss equation</td>
<td>8</td>
<td>TBA in the class</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Location</td>
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<tr>
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<tr>
<td>4/11</td>
<td>Midterm Exam #2</td>
<td>TBA in the class</td>
<td></td>
</tr>
<tr>
<td>4/13, 18, 20, 25, 27</td>
<td>Rapid prototyping</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5/11 (4:30-7PM)</td>
<td>Final Exam</td>
<td></td>
<td></td>
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</tbody>
</table>

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. **COURSE POLICIES**

**Attendance/Tardiness**
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.

**Extra Credit**
N/A

**Cell Phone Use**
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.

**Laptop Use**
Not allowed.

**Food in Class**
Not allowed.

**Missed Exam**
Makeup exam is possible only by one week ahead notice.

**Participation**
N/A

**Others**
• **Academic Integrity (University)**
  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 a failing grade.

• **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation **WILL NOT** automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, 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 Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- Disability Services
  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 (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  http://disabilityservices.tamucc.edu/

- Statement of Academic Continuity
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. OTHER INFORMATION

- Academic Advising
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for
Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.