# CVEN 305

## Mechanics of Materials

### Summer 2016

### Section 301

**Objectives:** To introduce students to applications of stress and deformation relationships for structural members subjected to axial, torsional, and bending loads, and thin-walled pressure vessels. Students will study stress and deformation of structural members under combined loadings, stability of columns, including indeterminate members.

**Prerequisites:** To take CVEN 305, you must have received a passing grade in CVEN 221 or the equivalent. Concurrent registration is not permitted in a prerequisite statics course in any section of CVEN 305.

**Lecture:** MWF 8:00 – 9:20 am, CE 110

**Instructor:** W. Lynn Beason, Ph.D., P.E.
Office: 701-C CE/TTI Building
e-mail: lbeason@civil.tamu.edu

**Office Hours:** End of Class – 10:45 am MWF and appointments as required.


**Grading:** Your letter grade for this course will be determined based upon grades from Homework assignments, two scheduled major exams, and a final exam as follows.

<table>
<thead>
<tr>
<th>Weekly Quizzes</th>
<th>Every Friday Beginning 6/3/2016</th>
<th>60%</th>
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</thead>
<tbody>
<tr>
<td><strong>Final Exam</strong></td>
<td>8/9/2016 8:00 – 10:00 am</td>
<td>30%</td>
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<tr>
<td><strong>Homework</strong></td>
<td></td>
<td>10%</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>100%</td>
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A: $P \geq 90$; B: $90 > P \geq 80$; C: $80 > P \geq 70$; D: $70 > P \geq 60$; F: $60 > P$

Beason’s Grading Rubric will be used to score the weekly quizzes.

**THERE IS NO POSSIBILITY FOR EXTRA CREDIT IN ANY FORM -- EVERYONE IS TREATED EQUALLY**
<table>
<thead>
<tr>
<th>2-Day Group</th>
<th>Textbook Reading Assignments</th>
<th>Video Viewing Assignments</th>
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<tbody>
<tr>
<td>6/1</td>
<td>INTRODUCTION</td>
<td>Statics Review</td>
</tr>
<tr>
<td>1) 6/3 and 6/6</td>
<td>Sections 1.1, 1.2, 1.2A, 1.2B, 1.2C, 1.2D, 1.3, 1.4, 1.5, 1.5A, 1.5B, 1.5C, 1.5D</td>
<td>Axial Stress, Uniform Bearing Stress, Uniform Shearing Stress, Pinned Axial Member, Stresses on Oblique Planes, General State of Stress, Plane Stress, Analysis and Design, Factor of Safety, LRFD</td>
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<tr>
<td>2) 6/8 and 6/10</td>
<td>Sections 2.1, 2.1A, 2.1B, 2.1C, 2.1D, 2.1E, 2.1F, 2.1G, 2.2</td>
<td>Axial Load, Indeterminate Axial Load, Indeterminate Superposition Axial Load</td>
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<tr>
<td>3) 6/13 and 6/15</td>
<td>Sections 2.3, 2.4, 2.5, 2.7, 2.10, 2.11</td>
<td>Temperature Axial Load, Poisson’s Ratio, Hooke’s Law, Shearing Stress, Complete Hooke’s Law, St Venant’s Stress Concentration</td>
</tr>
<tr>
<td>4) 6/17 and 6/20</td>
<td>Sections 3.1A, 3.1B, 3.1C, 3.2, 3.3 At this juncture, students are strongly encouraged to study Appendix A thoroughly.</td>
<td>Torsion, Angle of Twist, Axial Torsion Analogy, Torsion Example Problem, Gear Relationships, Composite Shaft Problem</td>
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<tr>
<td>5) 6/22 and 6/24</td>
<td>Sections 3.3, 3.4, 3.5</td>
<td>Fixed Shaft Problem, Power, Stress Concentration</td>
</tr>
<tr>
<td>6) 6/27 and 6/29</td>
<td>Sections 4.1, 4.1A, 4.1B, 4.2, 4.3, 4.4</td>
<td>Flexure Derivation, Composite Beam</td>
</tr>
<tr>
<td>7) 7/1 and 7/6</td>
<td>Sections 4.5, 4.7, 4.8, 4.9</td>
<td>Stress Concentration, Planar Eccentricity, Unsymmetric Bending, General Unsymmetric Bending</td>
</tr>
<tr>
<td>8) 7/8 and 7/11</td>
<td>Sections 5.1, 5.2, 5.3</td>
<td>Shear and Moment Equations, Shear and Moment Rules, Beam Design</td>
</tr>
<tr>
<td>9) 7/131 and 7/15</td>
<td>Sections 6.1, 6.1A, 6.1B, 6.1C, 6.3, 6.4</td>
<td>Shearing Stress in Beams</td>
</tr>
<tr>
<td>10) 7/18 and 7/20</td>
<td>Sections 7.1, 7.1A, 7.1B, 7.2</td>
<td>Stress Transformation I, Stress Transformation II, Mohr’s circle</td>
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<tr>
<td>11) 7/22 and 7/25</td>
<td>Sections 7.2, 7.3, 7.47.6,</td>
<td>Absolute Maximum Stress, Pressure Vessels, Spherical Pressure Vessels</td>
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<tr>
<td>12) 7/27 and 7/29</td>
<td>Sections 9.1, 9.1A, 9.2, 9.3,</td>
<td>Introduction to Beam Deflection, Beam Deflection Problem 1 Beam Deflection Problem 2, Beam Deflection Problem 3, Singularity Function, Singularity Function Problem 1</td>
</tr>
<tr>
<td>13) 8/1 and 8/3</td>
<td>Sections 9.3, 9.4, 9.4A, 9.4B,</td>
<td>Singularity Function Problem 2, Singularity Function Problem 3</td>
</tr>
<tr>
<td>14) 8/5 and 8/8</td>
<td>Sections 10.1, 10.1A, 10.1B, Final Review</td>
<td>Column Buckling</td>
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**Final Exam: 8/9/2016, Tuesday, 8:00 – 10:00 am**
2-Day Group: This class is formatted into fourteen 2-Day groups. While these 2-Day groups do not coincide with weeks, this is the most logical way to divide the material. The homework and video assignments will be assigned by 2-Day group as defined in the course coverage table on the previous page.

Websites: The McGrawHill website given below will serve as one of two central resources for this class throughout the semester. This website contains your text book and it provides the only interface for turning in your homework. **Membership in this website is required for this course.** Membership can be established by entering the code that you purchased at the bookstore at the following website:

http://connect.mheducation.com/class/l-beason-cven-301

If you would like to get access quicker (and perhaps cheaper), you can skip the book store and simply go to the above website (without a book store code) and join directly using a credit card. In the past, there has been a discount and an opportunity to purchase a ring-binder hard copy if you purchase directly from the McGrawHill site.

The second website is my personal website for this course located at:

https://ceprofs.civil.tamu.edu/lbeason/

There are worked examples at this site and in some cases, class notes will be published after the lecture.

Daily Videos: There is a set of video lectures organized by chapter and topic available on my personal web site. The videos may be accessed directly at the following address:

https://ceprofs.tamu.edu/lbeason/PassWord.html

The password to access the videos is “videos”.

The timing of the videos is presented in the course coverage table. It is your responsibility to **watch all of the videos prior to the specific topics being addressed in class.** You should refer to the textbook reading assignments presented in the course coverage table, the video assignments presented in the course coverage table, and the weekly homework assignments presented on the McGrawHill website to pace yourself through the videos.

Some class time will be devoted to clarifying information that is presented in the videos that may need further explanation or discussion. However, the bulk of our class time will be spent on pertinent examples and expansion of the material.
presented in the videos. **It will be very hard for you to do well in this class unless you watch all of the videos in a timely manner.**

**Weekly Quizzes:** Weekly quizzes will be administered every Friday. The first quiz on Friday, June 3, 2016 will be focused on a statics review of machines or frames.

The weekly quizzes will consist of one question each. The questions that appear on the weekly quizzes will be inspired by homework problems that are due up to and including the day of the weekly quiz and problems that are covered in class.

You will be expected to present a complete solution that contains all necessary figures, Free-Body-Diagrams, units, appropriate sign conventions. Your solution should be presented in a logical and methodical manner. You should provide an organized summary of your result. Often this will involve simply entering your answer in the blank provided.

All weekly quizzes will be graded using Beason’s Qualitative Grading Rubric as presented on my personal website. Please note that if your solution presentation is not clear and neat, an addition 2.5 will be deducted.

**Homework:** All homework is accessed through the McGrawHill website identified above. Your answers must be submitted through this website. This is the only way that you can receive credit for the assigned homework. The homework will be due as indicated on the McGrawHill website.

While you will not actually turn your paper work in for grading, I would advise you to prepare formal solution reports on 8-1/2” x 11” engineering paper using a pencil/pen and your hand for each problem assigned. **An acceptable engineering paper template is presented on my website if you do not want to buy commercial engineering paper.** You are free to construct your own custom paper or use free engineering paper that you received from potential employers.

All work should be presented on one side of the paper only. Begin each new problem on a new sheet. Your name, course, section number, problem number, and due date must appear at the top of each page. The current page number as well as the total number of pages in the assignment must appear in the upper right corner of each page. Initial each page in the lower right hand corner of your paper. The body of the report for each problem will consist of seven sections:

**Problem:** Give a problem statement in complete sentences.

**Given:** State all that is known about the problem in complete sentences.

**Required:** State what you have been asked to determine in complete sentences.
Figures: Almost every problem in this course will require a detailed Free-Body-Diagram in support of your solution! Draw all figures using a straight edge, show an appropriate and consistent set of units, number each figure, and when appropriate in the solution refer to a figure by its number.

Solution: Present your solution in a logical and methodical manner.

Summary: Provide an organized summary of the problem by listing each item from the required statement followed by its corresponding result from the solution section.

Initials: Initial each page in the lower right hand corner in indelible ink to indicate that you take full responsibility for the contents of the solution.

I would advise you to assemble all of the numbered calculation sheets for each assignment in a homework notebook. This notebook will be a very valuable resource as you prepare for the comprehensive final. In addition, you should bring your notebook with you should you need help.

Excused Absences (excerpt from Student Rules:)
http://student-rules.tamu.edu/

7.1 The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for absence. Among the reasons absences are considered excused by the university are the following: (Muster)

7.1.1 Participation in an activity appearing on the university authorized activity list. (see List of Authorized and Sponsored Activities)

7.1.2 Death or major illness in a student’s immediate family. Immediate family may include: mother, father, sister, brother, grandparents, spouse, child, spouse’s child, spouse’s parents, spouse’s grandparents, stepmother, step-father, step-sister, step-brother, step-grandparents, grandchild, step-grandchild, legal guardian, and others as deemed appropriate by faculty member or student’s academic Dean or designee.

7.1.3 Illness of a dependent family member.

7.1.4 Participation in legal proceedings or administrative procedures that require a student’s presence.

7.1.5 Religious holy day. (See Appendix IV.)

7.1.6 Injury or Illness that is too severe or contagious for the student to attend class.

7.1.6.1 Injury or illness of three or more days. For injury or illness that requires a student to be absent from classes for three or more business days (to include classes on Saturday), the student should obtain a medical confirmation note from his or her medical provider. The Student Health Center or an off-campus medical professional can provide a medical confirmation note only if medical professionals are involved in the medical
care of the student. The medical confirmation note must contain the date and time of the illness and medical professional’s confirmation of needed absence.

7.1.6.2 Injury or illness less than three days. Faculty members may require confirmation of student injury or illness that is serious enough for a student to be absent from class for a period less than three business days (to include classes on Saturday). At the discretion of the faculty member and/or academic department standard, as outlined in the course syllabus, illness confirmation may be obtained by one or both of the following methods:
   b. Confirmation of visit to a health care professional affirming date and time of visit.

7.1.6.3 An absence for a non acute medical service does not constitute an excused absence.

7.1.7 Required participation in military duties.

7.1.8 Mandatory admission interviews for professional or graduate school which cannot be rescheduled.

You will be expected to comply with both 7.1.6.2.a and 7.1.6.2.b to receive an excused absence.

Academic Integrity Statement:

“An Aggie does not lie, cheat, or steal or tolerate those who do.” Students are expected to understand and abide by the Aggie Honor Code presented on the web at: http://www.tamu.edu/aggiehonor. No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

Copyright Statement:

The handouts used in this course are copyrighted. By “handouts,” it is meant that all materials that have been generated for this course including those materials generated in all previous semesters. Such materials include but are not limited to syllabi, quizzes, exams, problem sets, worked problems, materials presented on my internet site, in-class materials, review sheets, additional problem sets, and/or solutions prepared for these materials. Because these materials are copyrighted, you do not have the right to copy them, or possess copies of them outside of the normal course uses for which they were intended. Certain violations of these copyrights can be treated as violations of academic integrity and will be handled in accordance with the Aggie Honor System Process described on the following web site: http://www.tamu.edu/aggiehonor.
Americans with Disabilities Act:

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 contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit [http://disability.tamu.edu](http://disability.tamu.edu).

It is your responsibility to contact the Office of Disability Services and notify me early in the semester if you intend to exercise your rights under the ADA. The Office of Disability Services is in complete charge of administering the ADA provisions. The Office of Disability Services has very strict rules regarding scheduling and timing. You must clear your participation in the ADA program with the Office of Disability Services early in the semester.