Course Description:
Topics include stress and strain, uniaxially loaded members, centroids and area moments of inertia, normal and shear stresses, beam deflections, buckling of columns, pressure vessels, combined stresses and failure criteria.

Prerequisites: ENGR 2401 or PHYS 2401

Credits: 3 Hours (Lecture: 3 Hours)

Instructor: Christopher J. Aul

Textbook: Mechanics of Materials
Authors: Beer, Johnston, DeWolf, Mazurek

Supplemental Materials: Engineering paper
Scientific calculator or better

Topics Covered:
Stress and strain relationships; axially loaded members; torsion and bending; shear and moment; combined loadings; stress and strain transformation; deflection of members; statically indeterminate members; buckling and failure criteria.

Course Learning Outcomes
By the end of the course, a successful student will be able to:
1. Understand the stress-strain behavior of ductile and brittle materials. (SO-2)
2. Understand the shear stress-strain behavior of homogeneous ductile materials. (SO-2)
3. Apply concepts of equilibrium and mechanics to members subjected to axial loads and determine displacement. (SO-1)
4. Apply concepts of equilibrium and mechanics to members under torsion and determine angle of twist. (SO-1)
5. Combine equilibrium, compatibility, and load-displacement relationships to understand support reactions for statically indeterminate members. (SO-1)
6. Analyze transverse shear and bending moment for beams deforming under load. (SO-1)
7. Determine complex models for analysis using methods detailed in combined loads including normal, shear, bending, and torsion. (SO-7)
8. Determine stresses in thin-walled spherical and cylindrical pressure vessels. (SO-1)
9. Calculate plane stresses at a point as well as plane-stress transformation to any specific direction for analysis. (SO-1)
10. Conduct analyses for design of prismatic beams (SO-2)
11. Apply mechanics methods for stability of structures, columns (SO-1)
**Student Outcomes**

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 3305.701 – Fall 2021
Mechanics of Materials
Department of Physics, Engineering, and Astronomy
Stephen F. Austin State University

Instructor: Christopher J. Aul, PhD
Office: Meet me in my Laboratory at Room 211 (STEM Building)
Student Hours: MWF 10-11am, TR 1-2pm, or by appointment
Class Meetings: MWF 9:00 AM - 9:50 AM, STEM Building Room 306
Course Home Page: http://d2l.sfasu.edu

Course Description
This is an introductory course in mechanics that builds upon lessons in statics to include material properties in design. Topics included are stress and strain relationships; axially loaded members; torsion and bending; shear and moment; combined loadings; stress and strain transformation; deflection of members; statically indeterminate members; buckling and failure criteria. Prerequisite: Engineering Statics course (Free body diagrams, point and distributed loads, body forces, force and moment vectors)

Text and Materials
Mechanics of Materials
Authors: Beer, Johnston, DeWolf, Mazurek

It is necessary that you acquire this edition of the text WITH ONLINE ACCESS (McGraw Hill CONNECT). Homework will be assigned through CONNECT so any version of the text you obtain make sure it has CONNECT access included.

A 14-day free trial is available from the beginning of class if you are unable to obtain the text on the first day.

Other materials needed in the course:
- Pencil and Ruler
- Engineering paper that is grid ruled (assignment submission)
- Scientific calculator (for exams and homework)

Grading Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>18%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>18%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>18%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>18%</td>
</tr>
<tr>
<td>Homework &amp; Assignments</td>
<td>14%</td>
</tr>
<tr>
<td>Course Project</td>
<td>14%</td>
</tr>
</tbody>
</table>

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%

The grade is based on three mid-term exams, one comprehensive final exam, homework which will be assigned in class, as well as in-class assignments. Exams will be graded on a 100-point scale.

Attendance Policy
Attendance will be taken at the beginning of class by instructor. If you have 3 unexcused absences, then your final grade will be reduced one letter grade. If you have 4 unexcused absences, you will receive an “F” in the course. A written and signed notice is required for an excused absence within three class days of the absence. To make sure that you are going to arrive to class on time you can set your watch here: http://www.time.gov/. Being late to class will result in a “late” for the day. Two “late” recordings will be made into an absence. Students who miss class without approval of their instructor 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 within one week following an excused absence. It is your responsibility to see your instructor and make arrangements for make-up work if you have an excused absence.

If you miss class due to technical issues you must get in touch with the instructor on the same day!

Course Requirements
In general, you will be required to spend at least 2 hours of time outside of class for every hour spent in class. Considering this class meets for 3 hours a week it is important to spend at least 6 hours working with course material outside of class. It is encouraged that you spend more time than this to properly attain course subject matter. Also, it is required that you meet with the professor before 9/30/2021 to chat about engineering and what you are planning for after graduation.

Exams
There will be three mid-term exams and a final, each covering a specific set of lecture, text, and homework material that will be communicated to the student in class. Each mid-term exam (Exams 1, 2, and 3) will be held at night and is shown on the course calendar. The final exam will be comprehensive to the material covered in the course. The tentative dates of these exams are listed in the course outline shown in this document. Students will have one week after each exam to review the exams and discuss the grades. No make-up exams will be given except in the case of an excused absence. An official written notice is required for an excused absence within three days of the exam. Any makeup exam must be taken within three days of the missed exam. The style of exam as well as allowed materials for the four exams will be communicated to the student in class.

Homework Assignments
Homework will be assigned from the required text for the course. Homework assignments will be given to the student in class along with the due dates. When completing homework, the following guidelines must be followed:

1. Always restate the problem and draw a diagram if needed – make sure to label appropriately
2. Make sure to outline what values are given and the values you are trying to solve for
3. Use engineering style paper that is grid ruled, or equivalent electronic version
4. Use only one side of the paper (typically the side facing you on the pad)
5. Include your name and page number on each page
6. Use a ruler to set up your diagrams or in drawing elements, or appropriate electronic equivalent
7. Show the progression of your solution, clearly identify appropriate units when necessary
8. Indicate final answers by placing a surrounding box, don’t forget the units!!
9. Submit your numerical answers over McGraw Hill CONNECT (links on D2L)
10. Scan your homework document clearly for submission through D2L

The above criteria, as well as accuracy of the information, will be used to grade your homework. Treat this as if I am your client and you need to impress me with your engineering calculations. Homework will be turned in at the due date via D2L dropbox. Homework due dates and times will be communicated to the student in class. No late homework will be accepted unless you have an excused absence.

In-Class Assignments
All in class assignments must be completed by the end of the class period. This may include working out example or homework problems on the board or separate assignments given throughout the class. The student may also be asked to present completed homework to the rest of the class in a “flipped class” manner. This is done to assess the communication and presentation skills of the student. The grade for these assignments and participation will be averaged with homework to give 14% of your final grade. It is the discretion of the instructor to grant additional time if deemed necessary.

C. Aul
ENGR 3305 – Mechanics of Materials
aulcj@sfasu.edu
Course Project
The course will include a project using laboratory equipment and involving data manipulation. Details on the project will be provided to the student in class. The final grade for these projects will constitute 14% of the final grade in this course.

Asynchronous Class Time
The course will include at a minimum of 150 minutes of asynchronous material. This will be presented via required online videos followed by quizzes and discussion board posts pertaining to the topics covered in class. Many times, this asynchronous material might be referred to as a “flipped” class in which students review the material on their own and come to class to practice solving problems under the guidance of the instructor.

Email Communication
All official course communication will be made using your SFA email account. You must use your SFA email account for all communications. You will be notified via your SFA email account about grades and attendance. You can look up your SFA email account or setup email forwarding using this link: http://www.sfasu.edu/mysfa/o365/forwarding-email/

It is important to practice good email communications in college courses. Use “ENGR 3305” in the subject of your email messages. Use complete sentences and capitalization when appropriate. The body of your email messages should begin with your instructor’s name and end with your name.

Classroom Policies
Obviously, times are trying and all of the information in this syllabus is subject to change. For our face-to-face meetings I ask you to please comply with the following:

- Wear a mask or face covering over your nose and mouth
- Stay 6 feet away from others in the classroom and in meetings with the instructor

The course may change structure at any point through the semester due to whatever 2021 may bring…
Academic Integrity (4.1)
Please copy and paste the following information regarding Academic Integrity into your syllabus. In addition, you may include your own guidelines for academic integrity as appropriate.

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/student-academic-dishonesty-4.1.pdf

Withheld Grades Semester Grades Policy (5.5)
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/.
Mental Health and Wellness
SFA values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
SFA Counseling Services www.sfasu.edu/counselingservices Rusk Building, 3rd Floor 936.468.2401

SFA Human Services Counseling Clinic www.sfasu.edu/humanservices/139.asp Human Services, Room 202 936.468.1041

Crisis Resources:
Burke 24-hour crisis line: 1.800.392.8343
Suicide Prevention Lifeline: 1.800.273.TALK (8255)
Crisis Text Line: Text HELLO to 741-741
ENGR 3305 – Mechanics of Materials Class Schedule

Course schedule is **tentative** and subject to change depending on pace of the class. Homework will be assigned based on material covered in class and in the assigned reading. Homework and due dates will be given in class.

<table>
<thead>
<tr>
<th>Week #</th>
<th>Week of:</th>
<th>Topic</th>
<th>Chapter Reading</th>
<th>Important Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/23/21</td>
<td>Stress, Review of Equilibrium, Design</td>
<td>1.1 - 1.5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8/30/21</td>
<td>Stress and Strain</td>
<td>2.1 - 2.7</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9/6/21</td>
<td>Axial Load</td>
<td>2.8 - 2.12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9/13/21</td>
<td>Centroids Review, Torsion</td>
<td>Appendices B &amp; C, 3.1</td>
<td>Exam 1 (CH 1 &amp; 2), 9/15/2021, 6-8pm</td>
</tr>
<tr>
<td>5</td>
<td>9/20/21</td>
<td>Torsion cont., Angle of Twist, Circular Shafts</td>
<td>3.2 - 3.5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>9/27/21</td>
<td>Bending Deformation, Stress Concentrations</td>
<td>4.1 - 4.5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>10/4/21</td>
<td>Shear and Bending-Moment Diagrams</td>
<td>5.1 - 5.3</td>
<td>Project Update</td>
</tr>
<tr>
<td>8</td>
<td>10/11/21</td>
<td>Shear and Bending Review</td>
<td>CH 4 &amp; 5</td>
<td>Exam 2 (CH 3 - 5), 10/13/2021, 6-8pm</td>
</tr>
<tr>
<td>9</td>
<td>10/18/21</td>
<td>Shearing Stresses in Beams</td>
<td>6.1, 6.3, 6.4</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10/25/21</td>
<td>Stress Transformation, Mohr's Circle</td>
<td>7.1 - 7.3</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11/1/21</td>
<td>Thin-walled Pressure Vessels, Principal Stresses</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>11/8/21</td>
<td>Deflection of Beams, Superposition</td>
<td>9.1 - 9.4</td>
<td>Exam 3 (CH 6 &amp; 7), 11/10/2021, 6-8pm</td>
</tr>
<tr>
<td>13</td>
<td>11/15/21</td>
<td>Columns</td>
<td>10.1, 10.3, 10.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11/22/21</td>
<td>Thanksgiving Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>11/29/21</td>
<td>Concept Reviews</td>
<td>TBA</td>
<td>Project Due</td>
</tr>
<tr>
<td></td>
<td>12/8/2021</td>
<td>Final Exam, Comprehensive (50% new material)</td>
<td>8 am-10 am</td>
<td></td>
</tr>
</tbody>
</table>
How to register for connect:

First log on to D2l via d2l.sfasu.edu and select your course CONTENT:

Then select the McGraw-Hill Connect DI link in the table of contents:

Then select the “Go to my Connect section”:
This will take you to the connect portal, to continue you will need to enter your SFA email address.

If you do not have a Connect account, you will be prompted to create an account.

Use your SFA email address when creating an account and be sure to use the name on your ID to be paired with my grading system – this way I will be able to get your homework graded correctly.
Class link directly through Connect:
https://connect.mheeducation.com/class/c-aul-fall-2021

You have three registration options.

1. **Connect Code:** Enter Connect access code and click **Re redeem**.

2. **Purchase Online:** Click **Buy It** to use a credit card or PayPal.

3. **Temporary Access:** Click **Access Now** for two-week access.
You have successfully joined the class. **Click Go To Connect.**

**Need Help?**

Tech Support & FAQ

Call: (800) 331-5094

Email & Chat: mhhe.com/support

Monday–Thursday: 24 hours

Friday: 12 a.m. – 9 p.m. EST

Saturday: 10 a.m. – 8 p.m. EST

Sunday: 12 p.m. –12 a.m. EST