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  Co-Requisites: None

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 3305.001 – Fall 2023
Mechanics of Materials
Department of Physics, Engineering, and Astronomy
Stephen F. Austin State University

Instructor: Christopher J. Aul, PhD
Office: Cole STEM Building, 207D
Email: aulcj@sfasu.edu
Phone: 936-468-1512

Student Hours: Mon Wed & Thur: 12-1pm, Tues: 12-2pm, or by appointment

Class Meetings: MWF 9-9:50am, STEM 306 in-person only

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

Exam 1 18%
Exam 2 18%
Exam 3 18%
Final Exam 18%
Homework & Assignments 14%
Course Project 14%

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.

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. This class assumes that you will be spending at least 2 hours per week outside of course time working on course material. A required 150 minutes of asynchronous material will be covered using course lectures and a course project.

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. Include your name and page number on each page
4. Use a ruler to set up your diagrams or in drawing elements, or appropriate electronic equivalent
5. Show the progression of your solution, clearly identify appropriate units when necessary
6. Indicate final answers by placing a surrounding box, don’t forget the units!!
7. Submit your numerical answers over McGraw Hill CONNECT (links on 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. 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.
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.

The following is required as per policy:

Academic Integrity (4.1)
The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one’s self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

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 coursework 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 to compute the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5-5.pdf.

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 promptly may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Student Wellness and Well-Being
SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, 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:
The Dean of Students Office (Rusk Building, 3rd floor lobby)
www.sfasu.edu/deanofstudents
936.468.7249
dos@sfasu.edu

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

The Health and Wellness Hub “The Hub”
Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:

- Health Services
- Counseling Services
- Student Outreach and Support
- Food Pantry
- Wellness Coaching
- Alcohol and Other Drug Education

www.sfasu.edu/thehub
936.468.4008
thehub@sfasu.edu

Crisis Resources:
- Burke 24-hour crisis line: 1.800.392.8343
- National Suicide Crisis Prevention: 9-8-8
- Suicide Prevention Lifeline: 1.800.273.TALK (8255)
- johCrisis 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>8/28/23</td>
<td>Stress, Review of Equilibrium, Design</td>
<td>1.1 - 1.5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9/4/23</td>
<td>Stress and Strain</td>
<td>2.1 - 2.7</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9/11/23</td>
<td>Axial Load</td>
<td>2.8 - 2.12</td>
<td></td>
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<tr>
<td>4</td>
<td>9/18/23</td>
<td>Centroids Review, Torsion</td>
<td>Appendices B &amp; C, 3.1</td>
<td>Exam 1 (CH 1 - 2), 9/21/2023, 5:30-7:30pm</td>
</tr>
<tr>
<td>5</td>
<td>9/25/23</td>
<td>Torsion cont., Angle of Twist, Circular Shafts</td>
<td>3.2 - 3.5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>10/2/23</td>
<td>Bending Deformation, Stress Concentrations</td>
<td>4.1 - 4.5</td>
<td></td>
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<tr>
<td>7</td>
<td>10/9/23</td>
<td>Shear and Bending-Moment Diagrams</td>
<td>5.1 - 5.3</td>
<td>Project Update</td>
</tr>
<tr>
<td>8</td>
<td>10/16/23</td>
<td>Shear and Bending Review</td>
<td>CH 4 &amp; 5</td>
<td>Exam 2 (CH 3 - 5), 10/19/2023, 5:30-7:30pm</td>
</tr>
<tr>
<td>9</td>
<td>10/23/23</td>
<td>Shearing Stresses in Beams</td>
<td>6.1, 6.3, 6.4</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10/30/23</td>
<td>Stress Transformation, Mohr's Circle</td>
<td>7.1 - 7.3</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11/6/23</td>
<td>Thin-walled Pressure Vessels, Principal Stresses</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>11/13/23</td>
<td>Deflection of Beams, Superposition</td>
<td>9.1 - 9.4</td>
<td>Exam 3 (CH 6 - 7), 11/14/2023, 5:30-7:30pm</td>
</tr>
<tr>
<td>11/20/23</td>
<td>Thanksgiving Break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11/27/23</td>
<td>Columns</td>
<td>10.1, 10.3, 10.4</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>12/4/23</td>
<td>Concept Reviews</td>
<td>TBA</td>
<td>Project Due</td>
</tr>
<tr>
<td>12/13/2023 - Final Exam, Comprehensive (50% new material)</td>
<td>8 am-10 am</td>
<td></td>
<td></td>
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</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.
You have three registration options.

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