

## ENGR 2332: Mechanics of Materials

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### 1: Course Logistics

- Semester: Fall 2019
- Section: 010
- Class Days: Tuesday and Thursday
- Class Time: 11:00am – 12:50pm
- Class Location: VIN 162 (Tuesday/Thursday) and HSEL (To Be Announced)

### 2: Instructor Information

- Instructor: Anthony Battistini, PhD
- Email: [anthony.battistini@angelo.edu](mailto:anthony.battistini@angelo.edu)
- Phone: (325) 486-5511
- Office: Vincent 271
- Office Hours: [Posted on Dr. Battistini's ASU Faculty Website](#)<sup>1</sup>

### 3: Required Materials

The textbook listed below is *recommended* only. The notes provided in class may be sufficient to learn the required material; however, I would prefer that you have a mechanics of materials textbook available for reference, especially in your pursuit to become a civil engineer. The concepts presented in this course are more challenging than those in ENGR 2301 Engineering Mechanics- Statics and the use of a textbook for extra clarification may be required. There are numerous textbooks/editions available that would be suitable (with Hibbeler being my preferred author). For your convenience, my class notes will reference chapters/sections in the recommended textbook. As the textbook is an older edition, cost is hopefully not prohibitive.

Hibbeler, R.C., Mechanics of Materials. 9th ed., Pearson Prentice Hall, 2014, ISBN: 978-0-13-325442-6.

It is also recommended that you purchase a binder to organize your notes for the class. The class primarily uses handouts, which are posted to Blackboard and need to be printed and brought class.

### 4: Prerequisites

- ENGR 2301 Engineering Mechanics – Statics
- MATH 2314 Calculus II

### 5: Course Description

**Catalog:** Stresses, deformations, stress-strain relationships, torsions, beams, shafts, columns, elastic deflections in beams, combined loading, and combined stresses.

**Objective:** The objective of this course is to develop a working knowledge of the concepts of stress and strain in deformable solids and to apply those principles to solve engineering problems.

## 6: Student Learning Outcomes

When you complete this course, you should be able to:

1. Explain the concepts of stress and strain as it relates to elastic and inelastic materials
2. Calculate forces and deformations in one-dimensional systems due to axial loads and torsional loads
3. Perform stress and strain transformations, including construction of Mohr's circle to identify principal stresses
4. Explain and apply basic material failure theories, particularly Tresca's and von Mises's criteria
5. Analyze forces, stresses, and deformations in elastic members due to transverse bending, shear, torsion, axial forces, and combined loadings
6. Solve for the internal forces and stresses in pressure vessels
7. Define the critical elastic buckling load for a column using a boundary theory approach
8. Design and conduct appropriate experiments to test engineering theories in relation to stress and strain in a team setting
9. Interpret and analyze experimental data to develop conclusions that reflect sound engineering judgment

## 7: Course Outcome Mapping

The mapping of the Student Learning Outcomes for the course to the ABET Criterion 3 Student Outcomes is shown in Table 1.

**Table 1: Student Learning Outcome Mapping to ABET Criterion 3**

Student Outcomes from ABET Criterion 3

Course Learning Outcome	1 Solve Problems	2 Design	3 Communication	4 Ethics & Professionalism	5 Teamwork	6 Experimentation	7 Acquire Knowledge
1	X						
2	X						
3	X						
4	X						
5	X						
6	X						
7	X						
8					X	X	
9			X		X	X	

## 8: Course Structure, Communication, Policies

The course will meet two times a week for class, where the instructor will be communicating new engineering theories and information to the students. This portion will last approximately 75 minutes, depending on the topic. Following class, the students will then participate in group activities to supplement the learning of the concepts introduced during class. These activities may include designing laboratory experiments, conducting laboratory experiments, solving additional engineering problems, and completing required assignments.

Lesson materials will be organized on the [Blackboard](#)<sup>2</sup> website for the course. You are expected to have access to the lesson handouts during class by either printing the handouts or having them available for modification on your computer/tablet. The handouts only outline the material for a given class and will need to be completed during class for the student to have the relevant information.

Attendance at lectures is required. Some of the material presented will correlate with the textbook, but other material will not and/or may be presented differently. You are responsible for all topics that are covered in class.

Important course announcements and changes will be sent by email via Blackboard. Students are expected to regularly check their Angelo State University email for these messages.

Academic integrity is expected from all students at all times in accordance with [Part I, Section B.1](#)<sup>3</sup> of the Angelo State University *Code of Student Conduct*.

Respect for your fellow classmates is required. Do not act in a manner that may distract others, including but not limited to: talking during lecture, texting, receiving obnoxious phone calls, watching YouTube videos, eating noisily, listening to loud music, walking to the front of the room during lecture just to turn your homework in because you were late to class, etc... If you need to do any of these activities, you are free to leave the classroom.

## 9: Professionalism

Professional engineering standard apply in this class. You are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. You are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) demonstrate sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accept constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

## 10: Graded Material

### 10.1: Final Grades

<b>Participation/In-Class Assignments:</b>	10%
<b>Laboratory Assignments:</b>	15%
<b>Homework:</b>	15%
<b>Exam I:</b>	20%
<b>Exam II:</b>	20%
<b>Final Exam:</b>	20%

All grades will be assigned on an absolute scale as a minimum. The instructor reserves the right to adjust the weights given to the assignments/homework/exams listed above. Any adjustments will be applied evenly to the entire class and never to the detriment of your grade.

### 10.2: Grading Scale

90.0% - 100%	<b>A</b>
80.0% - 89.9%	<b>B</b>
70.0% - 79.9%	<b>C</b>
60.0% - 69.9%	<b>D</b>
< 60.0%	<b>F</b>

### **10.3: Class Attendance, Participation, Timeliness, and In-Class Assignments**

- A portion of your grade will be based on participation. For full credit, students are expected to arrive to class on time and adequately prepared, meaning that any assigned readings and/or homework are already completed by the time the class period begins.
- Participation points will be assigned at the discretion of the instructor, and may be based upon the following:
  - Attendance throughout the class period (sometimes recorded by photograph)
  - Completion of homework or reading assignments
  - Willingness to answer a question when called upon (answer does not have to be correct)
  - Effort displayed during group activities or in-class assignments
- In-class assignments may be given periodically to help identify student understanding of the material.
- Students may work together on in-class assignments, but may have to turn in his or her own problem work.
- If you will be absent, please make prior arrangements with the instructor. Make-up participation or in-class assignments will not be given.

### **10.4: Laboratory Assignments**

- Throughout the semester, you will need to complete laboratory experiments, assignments, and reports. These assignments will be longer and/or more comprehensive than a typical homework problem.
- Use of Microsoft Word, Excel, and PowerPoint (or equivalent software) may be required to receive full credit.
- Some laboratory assignments may be completed and submitted individually, while others may be submitted in groups.
- It is noted that nearly all worthwhile accomplishments from raising a family to launching the space shuttle are the work of teams. Civil engineering is no exception. All significant civil engineering projects are completed by teams. You will be assigned to laboratory teams throughout the semester and are expected to participate, communicate, and work effectively together with your team on group assignments.
- Specific information regarding laboratory experiments, including any necessary safety precautions, and subsequent assignments and reports will be posted to Blackboard and discussed during class.
- You will be issued a (1) pair of safety glasses for the semester. You are expected to bring them with you to lab on the appropriate days.

### **10.5: Homework**

- Homework is due to the instructor by 11:00am on the day specified on the course schedule.
- Late homework may not be accepted for full credit, unless previous arrangements with the instructor are made. Please talk to me!!
- Late homework is subject to additional deductions at the discretion of the instructor. In general, it is more beneficial to turn in late homework that you have tried to complete than it is to turn in "junk" on time.
- Neatness counts! As an engineer and a professional, your work will often be read and scrutinized by others. In some instances, it could be a legal document or a piece of evidence in a court of law. It is your responsibility that the work you prepare is presented in a legible, methodical, and logical manner.

- Any handwritten homework should be performed directly on the printout of the homework or on one side of 8.5" x 11" engineering computation paper, either the "green" paper or a black and white copy of it (available on Blackboard).
- Each problem should be performed on a separate page.
- The solution should include: the problem statement, solution steps, and answer. Key intermediate values should be indicated by underlining or some other means, and the final answer should be **boxed/circled.**
- Units should be included with all answers.
- Sketches/diagrams should be made with a straight edge.
- Name, date, and problem info should be included on each page. See the example homework solution posted to Blackboard, which meets all of these requirements.
- Students may collaborate to complete the homework; however, each student must turn in his/her own assignment for grading. Direct copying of other's work is not allowed and may be subject to disciplinary actions.
- Homework problems will be graded out of 10 pts unless otherwise noted (if 2 problems, 20 pts total; if 4 problems, 40 pts total).
- At the end of the semester, 30 pts will be added to your homework total. This will account for any lost points or missed problems.
- To facilitate the return of graded homework, a folder containing all graded papers may be passed from student to student at the beginning of class. While the grade will not appear on the front page, it is possible that other students could view your grade for the homework. In accordance with the Family Educational Rights and Privacy Act of 1974 (FERPA), students must consent to disclose these educational records. If you do not consent, please notify me by email and I will separate your homework from the others and return it individually. Otherwise, it is assumed that you consent to this mechanism of return. Graded exams and/or lab reports will be returned individually.

### **10.6: Exams**

- Make-up exams will only be given for extenuating circumstances, unless prior arrangements with the instructor are agreed upon. Proof, such as a doctor's note or other official document, may be required for unexcused absences during an exam.
- Exams will not be open textbook or notes, but the use of a formula/cheat sheet will be permitted. Details will be discussed closer to the exam time.
- Exams I and II will be 1.75 hours long and will be given during the class periods indicated on the course schedule. The final exam will be given according to the university's standard schedule ([Angelo State University Final Exam Schedule](#)<sup>4</sup>) on Tuesday, December 10, 2019 from 10:30am-12:30pm.

## **11: Classroom and University Policies and Student Support**

### **11.1: General Policies**

All students are required to follow the policies and procedures presented in the [Angelo State University Student Handbook](#)<sup>5</sup> and [Angelo State University Catalog](#)<sup>6</sup>.

### **11.2: Student Disability Services**

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the

Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA), and subsequent legislation.

The Office of Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student's responsibility to initiate such a request by contacting Ms. Dallas Swafford, Director of Student Disability Services, at 325-942-2047 or [Dallas.Swafford@angelo.edu](mailto:Dallas.Swafford@angelo.edu), or visit the [Student Disabilities Services Website](#)<sup>7</sup>.

### **11.3: Title IX Statement**

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. Sex discrimination, sexual misconduct, public indecency, interpersonal violence, sexual assault, sexual exploitation, sexual harassment, and stalking are not tolerated at ASU.

As a faculty member, I am a Responsible Employee meaning that I will report any allegations I am notified of to the Office of Title IX Compliance in order to connect students with resources and options in addressing the allegations reported. You are also encouraged to report any incidents involving yourself or someone you know to ASU's Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator. You may do so by contacting:

Michelle Boone, J.D., Director of Title IX Compliance by calling 325-942-2022, by emailing [Michelle.Boone@angelo.edu](mailto:Michelle.Boone@angelo.edu), or by visiting the Mayer Administration Building, Room 200.

You may also file an incident report anonymously online anytime using the [ASU Incident Report Form](#)<sup>8</sup>.

If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

The Office of Title IX Compliance also provides accommodations related to pregnancy (such as communicating with your professors regarding medically necessary absences, modifications required because of pregnancy, etc.). If you are pregnant and need assistance or accommodations, please contact the Office of Title IX Compliance utilizing the information above.

For additional information, visit [ASU's Title IX website](#)<sup>9</sup>.

### **11.4: Observance of Religious Holy Day**

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for [Observance of Religious Holy Day](#)<sup>10</sup> for more information.

### **11.5: Incomplete Grade Policy**

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#)<sup>11</sup> for more information.

### **11.6: Student Conduct Policies**

#### **11.6.1: Academic Integrity**

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the Statement of [Academic Integrity](#)<sup>12</sup>

### **11.6.2: Plagiarism**

Plagiarism is a serious topic covered in ASU's [Academic Integrity Policy](#)<sup>13</sup> in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality via Turnitin. Resources to help you understand this policy better are available at the [ASU Writing Center](#)<sup>14</sup>.

### **11.6.3: Copyright Policy**

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

## **12: Course Specific Information**

### **12.1: Photo/Video Policy**

- Lectures, classroom activities, and laboratory experiments throughout the course may be photographed/filmed by the instructor for educational purposes pertaining to research and scholarship. Personally identifying information will not be used. An informed consent form and copyright release form will be forthcoming.
- Some pictures/videos may be included on social media by the ENGR department and/or professor. In general, students will be informed prior to public posting of this content.
- Students are allowed to take photos/videos of lectures and classroom activities provided the following conditions are met:
  - The capturing of the photo/video is not disruptive to other students or the professor.
  - The photos/videos are for personal use only (not posted publicly), unless otherwise discussed.
  - Fun photos/videos are shared with the professor 😊

## **13: Instructor Prerogative**

The instructor reserves the right to change the policies and procedures of this course when he deems it necessary. Any such changes will be implemented fairly and will typically not be a detriment to your grade. The instructor will notify you of any such changes in a timely manner.

### **13.1: Diversity and Equity Statement**

The instructor strives to promote a living and learning environment for outstanding growth and productivity among all students, faculty and staff. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, sexual orientation, or socio-economic background. Diversity also entails different viewpoints, philosophies, and perspectives. Course activities and attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected. All students in my classroom are expected to show respect for one another.

## 14: Course Outline

The course outline is presented in Table 2. Detailed reading and homework assignments along with updates to this schedule will be provided via Blackboard.

**Table 2: Course Outline**

Lesson	Day	Date	Text	Notes/Topic	Assignment Due
01	Tuesday	8/27		Syllabus, Course Discussion, First Day Rap Up	
02	Thursday	8/29	3.1-2	Stress vs Strain; Lab 01A	Homework 00
03	Tuesday	9/3	3.3-4; 3.6	Material Properties	Homework 01
	Thursday	9/5		Lab 01B: Stress vs Strain Material Tests	
04	Tuesday	9/10	4.1-2	1D Bars- Deflection I; Lab 02A	Homework 02
05	Thursday	9/12	4.3-5	1D Bars- Deflection II; Lab 02B	
06	Tuesday	9/17	4.6-7	1D Bars- Deflection III	Homework 03
07	Thursday	9/19	5.1-2	1D Bars- Torsion I; Lab 02C	Lab 01
08	Tuesday	9/24	5.4-5	1D Bars- Torsion II	Homework 04
09	Thursday	9/26		Exam I Review	
10	Tuesday	10/1	9.1-3	Stress Transformation, Principal Stresses	Homework 05
	Thursday	10/3		<b>EXAM I</b>	
11	Tuesday	10/8	9.4-5	Mohr's Circle	Homework 06
	Thursday	10/10		Lab 03A: Concrete Mixing Day	Lab 02
12	Tuesday	10/15	10.1-2; 10.5-6	Strain Transformation and Gages	Homework 07
13	Thursday	10/17	10.7	Failure Theories; Lab 04	
14	Tuesday	10/22	6.1-3	V, M Diagrams	Homework 08
15	Thursday	10/24	6.4-5	V, M Diagrams [cont]; Bending Stresses I	Lab 03A
16	Tuesday	10/29	6.4-5	Bending Stresses II; Lab 05A	Homework 09
17	Thursday	10/31		Exam II Review; Lab 05B	Lab 04
18	Tuesday	11/5	12.1-2; 12.7	Beam Deflections	Homework 10
	Thursday	11/7		Lab 03B: Concrete Cylinder Tests	
	Tuesday	11/12		<b>EXAM II</b>	
19	Thursday	11/14	7.1-2	Shear Stresses	Homework 11
20	Tuesday	11/19		<b>NO CLASS;</b> Combined Loadings I Video and Activity	Lab 05
21	Thursday	11/21	8.1	Pressure Vessels; Lab 06	Lab 03B; Lab 06
22	Tuesday	11/26	13.1-3	Buckling; Lab 07	Homework 12; Lab 07
	Thursday	11/28		<b>NO CLASS- THANKSGIVING HOLIDAY</b>	
23, 24	Tuesday	12/3	8.2; 11.1- 2; 11.4	Combined Loadings II; Final Review	
25	Thursday	12/5		AMechanics Race	Homework 13
	Tuesday	12/10		<b>FINAL EXAM, 10:30am-12:30pm</b>	

## 15: End Notes: Complete Hyperlinks From Syllabus

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- <sup>1</sup> <http://www.angelo.edu/content/profiles/6463-anthony-d-battistini>
- <sup>2</sup> <https://blackboard.angelo.edu/>
- <sup>3</sup> <https://www.angelo.edu/student-handbook/code-of-student-conduct/misconduct.php>
- <sup>4</sup> [https://www.angelo.edu/services/registrar\\_office/final.php](https://www.angelo.edu/services/registrar_office/final.php)
- <sup>5</sup> <http://www.angelo.edu/student-handbook/>
- <sup>6</sup> <http://www.angelo.edu/catalogs/>
- <sup>7</sup> <http://www.angelo.edu/services/disability-services/>
- <sup>8</sup> [https://cm.maxient.com/reportingform.php?AngeloStateUniv&layout\\_id=1](https://cm.maxient.com/reportingform.php?AngeloStateUniv&layout_id=1)
- <sup>9</sup> <https://www.angelo.edu/services/title-ix/>
- <sup>10</sup> <http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>
- <sup>11</sup> <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>
- <sup>12</sup> <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>
- <sup>13</sup> <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>
- <sup>14</sup> [https://www.angelo.edu/dept/writing\\_center/academic\\_honesty.php](https://www.angelo.edu/dept/writing_center/academic_honesty.php)