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## Mechanical Design

<b>Textbook:</b>	<b>Mechanical Engineering Design: Shigley's 11<sup>th</sup> ed.</b> by Richard G. Budynas and J. Keith Nisbett
<b>CRN:</b>	33541
<b>Class Meeting time:</b>	1:15 - 2:20 pm. MTWRF
<b>Class Room:</b>	Online
<b>Prerequisite:</b>	Mechanics of Materials
<b>Instructor:</b>	Methaq Abed, Ph.D., P.E.
<b>Office:</b>	Engineering Building, A104
<b>Email:</b>	msabed@utep.edu
<b>Office Hours:</b>	Virtual office hours will be available by appointment. Please give 48 hours to reply to your email.
<b>Class Duration:</b>	June 8 <sup>th</sup> , 2020 - July 31 <sup>st</sup> , 2020



### Course Description:

This 3 credit hour class is intended to provide the students with intensive learning about the analysis and design concepts for beams, rods in three dimensions. Besides, to learn how to calculate the deflections of the essential elements in the structure at the critical locations. New concepts about the consideration of the buckling in the design process will be discussed, as well as determining the final design factor for the component. The use of software to compare the analysis results for a project may be needed.

### Course Objective:

At the end of this class, the typical students should be well prepared in the following areas:

- 1- Identify the material as brittle or ductile.
- 2- Analyze any given type of structures or machines and identify the principal stresses at the critical sections.
- 3- Related the principal stresses to the failure criterion.
- 4- Selecting the design choices.
- 5- Calculate the fatigue and included the essential factors.

### Topics covered

1. Introduction (Chapter 1)
2. Materials (Chapter 2)
3. Load and stress analysis (Chapter 3)
4. Deflection and stiffness (Chapter 4)
5. Failures resulting from static loading (Chapter 5)
6. Fatigue (Chapter 6)



## Grades

Your grade for this course will be assessed based on your performance in:

Mid-term exams (70 %)

Homework (20%)

Participation through Yuja/ Video Quiz (10%)

**Exams:** There will be four exams. *No makeup exam will be given under any circumstances. If you miss two exams, the instructor has the right to drop you or assign you an "F" grade for the class. The exams' grade will be calculated based on the average of the three highest tests' grade. It means that the lowest test grade will be dropped. If a student misses only one test for any reason and it can be for technology issues (such as internet issues), that would be his/her lowest test to be dropped.*

**Homework:** All homework assignments will be through McGraw Hill connect. Therefore, all students are required to register for the course through McGraw Hill connect during the first week of class. If a student fails to register to the course after one week of starting the class, the instructor has the right to drop him/her from class. No homework outside the McGraw Hill Connect will be accepted.

**Participation:** The students are expected to log in to the Blackboard at least two times a week. To ensure that the students were getting the materials posted in the Blackboard, you are required to take the Yuja quiz, or respond to discussion board depends on the activity for that week.

**Drop/Withdrawal Deadline:** July 10<sup>th</sup>, 2020.

## Grade Scale

Your final grade will be calculated based on the points you have accumulated as follows:

A	≥88
B	≥78 but <88
C	≥68 but <78
D	≥58 but <68
F	<58

## Late Work Policy

Homework assignments will be due on Sundays at 11:59 pm. Late homework will be penalized by a 50% deduction per day after the deadline. For all other types of assignments, no late work will be accepted.

## Attendance Policy

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Since this is an online class, attendance is determined by class participation online. Students must be prepared, participate in online individual/group discussions, and complete the course modules to understand and incorporate the rhetorical strategies and processes used to complete the assignments. Participation is worth 10 percent of the final grade.

### **Technology Requirements**

Course content is delivered via the Internet through the Blackboard learning management system (LMS). Ensure your UTEP email account is working and that you have access to the Web. You may use any of the primary Web browsers—Explorer, Google Chrome, Firefox, Safari, etc. When having technical difficulties, try switching to another browser.

You will need to have or have access to a computer/laptop, printer, scanner, a webcam, and a microphone. You will need to purchase a USB (flash drive). You will need to download or update the following software: Microsoft Office, Adobe, Flashplayer, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course. If you encounter technical difficulties of any kind, contact the Help Desk.

### **Netiquette**

- o Always consider the audience. Remember that members of the class and the instructor will be reading any postings.
- o Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- o When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation.
- o Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professors only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation first to request the permission of the writer(s).

### **Drop Policy**

To drop this class, please contact the [Registrar's Office](#) to initiate the drop process. If you cannot complete this course for whatever reason, please contact me. If you do not, you are at risk of receiving an "F" for the course.

### **Accommodations Policy**

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with

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Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#).

### Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more [HOOP: Student Conduct and Discipline](#).

### Student Resources

UTEP provides a variety of student services and support:

**UTEP Library:** Access a wide range of resources, including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.

**Help Desk:** Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in-person if on campus.

- **University Writing Center (UWC):** Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- **Math Tutoring Center (MaRCS):** Ask a tutor for help and explore other available math resources.
- **History Tutoring Center (HTC):** Receive assistance with writing history papers, get help from a tutor, and explore other history resources.
- **Military Student Success Center:** UTEP welcomes military-affiliated students to its degree programs, and the Military Student Success Center and its dedicated staff (many of whom are



veterans and students themselves) are here to help personnel in any branch of service to reach their educational goals.

- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

**ACES & Tutoring Center**

Please note there are tutoring services available in the ACES center. Tutoring is free to you; the Department pays them. If tutors are not used, the Department may stop funding them. Check the schedule of the tutors and make use of the services. For more details, visit the

**ME Advising Blackboard -> cc mech acadav: MECH Academic Advising -> Tutoring & Resources**

At the link, you can find tutor schedules, location of the ACES center, and the list of tutors available. For more information, send email to [METutors@utep.edu](mailto:METutors@utep.edu)

**Harassment Policy**

The Department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the Department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment, but repeated questions about a grade or an administrative decision are.
- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.

**Course Schedule**

MODULE	OBJECTIVES	ACTIVITIES	ASSESSMENTS	CONSTRAINTS
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<p><b>Week -1</b></p>	<p>-Syllabus &amp; course overview</p> <p>-Review concepts of axial loading and deformation, and bending</p> <p>- Chapter-1- from Textbook.</p>	<p><b>-Discussion Board</b></p> <p>Introduction: Introduce yourself with a small bio, or with a small photo recommended.</p> <p><b>- Read:</b></p> <p>lectures (1-3), and chapter-1 lecture.</p> <p><b>-Watch videos for week 1</b></p>	<p>-Syllabus Quiz</p> <p>-Discussion board</p>	<p>- Due date for Syllabus quiz: Sunday, June 14<sup>th</sup> at 11:59 pm.</p> <p>- Due date for discussion board by a minimum of 1 post: Sunday at 11:59 pm.</p> <p>-Expected study time: 5 hours</p>
<p><b>Week -2</b></p>	<p>-Mechanical materials</p> <p>-Load and Stress Analysis for Simple Structures</p> <p>-Singularity Functions</p>	<p><b>- Read Chapters 2&amp; 3 (Sections 3.1-3.3)</b></p> <p><b>Or</b></p> <p>(Posted files for chapters 2&amp;3 on BB).</p> <p><b>-Watch videos for week 2</b></p>	<p><b>Exam #1</b></p> <p>-H.W.#1</p> <p>-Yuja/Video Quiz, for participation</p>	<p><b>Exam #1 on Friday, June 19<sup>th</sup>. The test will cover the materials for weeks 1 and 2.</b></p> <p>- H.W.#1 due on Sunday, June 21<sup>st</sup>, at 11:59 pm. through McGraw Hill Connect.</p> <p>-Yuja/Video Quiz due on Sunday at 11:59 pm.</p> <p>Expected study time: 6 hours</p>
<p><b>Week -3</b></p>	<p>-Stress Components</p> <p>-Principals' Stresses and Mohr's Circle</p> <p>-3D Analysis of Structures</p>	<p><b>- Read:</b> Chapter -3- part 2 (Sections 3.4-3.11)</p> <p>Or look at the posted lectures).</p> <p><b>-Watch videos for week 3</b></p>	<p>- H.W.#2</p> <p>-Yuja/Video Quiz, for participation</p>	<p>-H.W.#2 due on Sunday, June 28<sup>th</sup>, at 11:59 pm. through McGraw Hill Connect.</p> <p>-Yuja/ Video Quiz due on Sunday at 11:59 pm</p> <p>Expected study time: 6 hours</p>



<b>Week -4</b>	-Torsion  -Thin-Walled Sections	- <b>Read:</b> Chapter-3- parts 2&3 (Section 3.12)  - <b>Watch</b> videos for week 4	- <b>Exam #2</b>  - H.W.#3  - Yuja/Video Quiz, for participation	- <b>Exam #2 on Friday, July 3<sup>rd</sup>. The test will cover the materials for weeks 3&amp;4.</b>  -H.W.#3 due on Sunday, July 5 <sup>th</sup> , at 11:59 pm.  -Yuja Quiz due on Sunday at 11:59 pm  Expected study time: 6 hours
<b>Week -5</b>	- Deflections and Buckling for Compression Members	- <b>Read:</b> Chapter-4  -Look at the posted lectures.  - <b>Watch videos for week 5</b>	-H.W.#4  -Yuja Quiz, for participation	-H.W.#4 due date: Sunday, July 12 <sup>th</sup> at 11:59 pm  -Yuja /Video Quiz due on Sunday at 11:59 pm.  Blackboard Collabor. Ultra, meeting time from 1:00 to 2:00 pm.  Expected study time: 5 hours
<b>Week -6</b>	- Failures Resulting from Statics Loads	- <b>Read:</b> Chapter-5-  -Look at the lectures posted  - <b>Watch videos for week 6</b>	- <b>Exam #3</b>  - H.W.#5  - Yuja/ Video Quiz	<b>Exam #3 on Friday, July 17<sup>th</sup>. The test will cover the materials for weeks 5&amp;6.</b>  -H.W.#5 due on Sunday, July 19 <sup>th</sup> , at 11:59 pm.  -Yuja/ Video Quiz due on Sunday at 11:59 pm  Expected study time: 6 hours
<b>Week -7</b>	- Fatigue Failure Resulting from Variable Loads	- <b>Read:</b> Chapters 5&6 - Look at the lectures posted  Watch videos for week 7	-H.W.#6  -Yuja/ Video Quiz	-H.W.#6 due on Sunday, July 26 <sup>th</sup> , at 11:59 pm.  -Yuja/ Video Quiz due on Sunday at 11:59 pm  Expected study time: 7 hours



<b>Week -8</b>	- Fatigue Failure Resulting from Variable Loads	- <b>Read:</b> Chapter -6, - - Look at the lectures posted  - Watch videos for week 8	<b>-Exam #4</b>	- <b>Exam #4 on Thursday, July 30<sup>th</sup> , test will cover the materials for weeks 7&amp;8.</b>  <b>End of the course.</b>
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**The above schedule, policies, and assignments in this course are subject to change in the event of extenuating circumstances or by mutual agreement between the instructor and the students.**