University of Utah
Department of Mechanical Engineering
Strength of Materials

Spring 2017

Instructor:	Dr. Pania Newell	**Time:**	T Th 10:45 – 12:05
Email:	pania.newell@utah.edu	**Place:**	MEK 3550

TAs info:

- **Class TA:**
  Abhidnya Vijaykumar Patharkar pabhidnya@gmail.com

- **Lab TAs:**

Name	Email	Office hour	Location
Matt Byrne	matt.byrne7@gmail.com	Thursdays 4:00 - 5:00 PM	MEB 1430
Peter Creveling	creveling.peter@gmail.com	Fridays 10:00 - 11:00 AM	MEB 2407
Sameer Nandikar	sameernandikar@gmail.com	Mondays 1:45 - 2:45 PM	MEK 0540

Office Hours: T Th 12:05 – 1:05, or by appointment.

Prerequisites: C- or better in (ME EN 1300 AND MATH 2250) AND Full Major status in Mechanical Engineering. Corequisites: C- or better in ((MATH 2210 OR MATH 1260 OR MATH 1280 OR MATH 1321 OR MATH 3140) AND MSE 2160).

Textbook: Mechanics of Materials, 7^{th} ed., Beer et al, McGraw-Hill, 2015 (ISBN:0073398233).

Summary: Shear and bending moment in beams, torsion of circular and noncircular sections, bending and shear stresses in beams, deflection of beams, statically indeterminate members and structures. Failure criteria, stress concentrations, column buckling. Laboratory in mechanical behavior of materials and stress analysis included.

Objectives: This course is primarily designed for undergraduate students and provides an introduction to the mechanics of solids subjected to stress and strain with applications to science and engineering. At the end of the course, the students will be able to:

1. distinguish between various type of loadings such as: axial, torsional, flexure, pressure, impact, and combined loading,

2. calculate stresses and strains under various loadings,

3. resolve stresses and strains onto various planes and determine their principal components,
4. analyze the vulnerability of these structures to various failure modes under various loadings,
5. determine failure mechanisms such as yielding, brittle failure, creep, fatigue, and buckling.

Homework: Homework will be assigned every week on Tuesdays and will be **due at 5:30 PM the following Tuesday**. Late homework **WILL NOT** be accepted without prior approval.
In order to receive homework credit:

1. You **MUST** clearly demonstrate the whole solution process.
2. All homework assignments **MUST** be presented in a clear manner.
3. Each page **MUST** have a header with **Name, Homework #, Problem #, Due Date**.
4. Each problem **MUST** have a **Problem info: What is given, What needs to be found**.
5. Place **No** more than one problem solution on a page.
6. The final answer(s) **MUST** be underlined, boxed or circled.
7. Homework that will **NOT** follow the above format, **will be returned with a zero**.
8. Students are expected to work independently. **Offering** and **accepting** solutions from others is an act of **plagiarism**, which is a serious offense and **all involved parties will be penalized according to the university policy**. Discussion amongst students is encouraged, but when in doubt, direct your questions to the professor.

Quizzes: un-announced quizzes will be given based on the material covered in the class and in the assigned reading/homework.

Laboratory: The laboratory component is an integral part of the course. The purpose of this laboratory is to provide each student with hands-on experiences in mechanical testing and stress analysis. The laboratory had been assigned to complement the classroom topics and enhance student comprehension. A separate handout provided in the laboratory will discuss the procedures to be followed in the lab. Laboratory sections will meet weekly in 1186 MEB beginning the 3^{rd} week of the semester (1/23-27).

Tentative Course Outline:

Date	Lecture	Lecture topic	Lab topic
Jan. 10	1	Intro/Units/type of stresses	No Lab
Jan. 12	2	Stress & strain, mechanical properties	No Lab
Jan. 17	3	Axially loaded memberes	No Lab
Jan. 19	4	Torsion	No Lab
Jan. 24	5	Torsion	Tensile/Hardness/Torsion
Jan. 26	6	Shear and moment diagrams	Tensile/Hardness/Torsion
Jan. 31	7	Normal stresses in bending	Tensile/Hardness/Torsion
Feb. 2	8	Shear stresses in bending	Tensile/Hardness/Torsion
Feb. 7	9	Exam #1	Tensile/Hardness/Torsion
Feb. 9	10	Stress/strain transformation, strain gages	Tensile/Hardness/Torsion
Feb. 14	11	2D Mohr's circle	Riveted joints-Introduction
Feb. 16	12	2D Mohr's circle	Riveted joints-Introduction
Feb. 21	13	3D stress-strain	No Lab
Feb. 23	14	Thin Walled pressure vessels	No Lab
Feb. 28	15	Combined loading	Riveted joints-Competition
Mar. 2	16	Combined loading	Riveted joints-Competition
Mar. 7	17	Theories of failure	Bending/Pressure Vessels/Combined Loading
Mar. 9	18	Exam #2	Bending/Pressure Vessels/Combined Loading
Mar. 14		Spring Break	
Mar. 16		Spring Break	
Mar. 21	19	Theories of failure	Bending/Pressure Vessels/Combined Loading
Mar. 23	20	Beam deflection	Bending/Pressure Vessels/Combined Loading
Mar. 28	21	Beam deflection	Bending/Pressure Vessels/Combined Loading
Mar. 30	22	Statically indeterminant problems	Bending/Pressure Vessels/Combined Loading
Apr. 4	23	Statically indeterminant problems	Experimental Design Lab Proposal
Apr. 6	24	Buckling of columns	Experimental Design Lab Proposal
Apr. 11	25	Buckling of columns	Experimental Design
Apr. 13	26	Exam #3	Experimental Design
Apr. 18	27	Energy methods	Buckling
Apr. 20	28	Energy methods	Buckling
Apr. 25	29	Final Review	No Lab
May. 1		Final Exam	10:30 AM - 12:30 PM, MEK 3550

Grading Policy:

Laboratory	20%
Homework	15%
Quizzes	5%
3 Midterms Exams	39% (13% each)
Final Exam	21%

Letter Grade Distribution:

>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 60.00	F

In order to **PASS** the course, you need to obtain an average passing grade on the exams, which is > **70**.

Important Dates:

Midterm #1 ..... February 7^{th}, 2017
Midterm #2 ..... March 9^{th}, 2017
Midterm #3 ..... April 13^{th}, 2017
Final Exam ..... May 1^{st}, 2017

Course Policies:

- **General**
  - Quizzes and exams are closed book, closed notes.
  - **No makeup quizzes or exams will be given** unless it falls into the university policy.
- **Grades**
  - Grades in the **C** range represent performance that **meets expectations**; Grades in the **B** range represent performance that is **substantially better** than the expectations; Grades in the **A** range represent work that is **excellent**.
  - Grades will be maintained in the University record system. Students are responsible for tracking their progress by referring to the online canvas system.
- **Attendance and Absences**
  - Attendance is expected and will be taken each class. You are allowed to miss **ONE** class during the semester without penalty. Any further absences will result in point and/or grade deductions.

  - Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.

- **Miscellaneous**
  - **Turn off** your cell phone during class. If caught texting or talking on the phone, the instructor has the full right to ask you to leave the classroom immediately.
  - Laptops should be **ONLY** used for taking notes and viewing lecture slides.
  - **Be aware** of all the announcements or changes made by the instructor for the course.
  - **Do not engage** in talking or disruptive behavior in the class.
  - **Do not use** tobacco or similar product during class.
  - **Work** extra problems to understand the topic.
  - **Seek** timely help if you are not making satisfactory progress.
  - **Conduct** oneself in a respectful and professional manner.

Student Code:

Policy 6-400: Code of Student Rights and Responsibilities (Student Code) is in http://regulations.utah.edu/academics/6-400.php.

College of Engineering Guideline: College of Engineering Guideline can be found at: http://www.coe.utah.edu/wp-content/uploads/pdf/faculty/semester_guidelines.pdf

Academic Honesty: Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation.