



Strength of Materials for Technology

The University of Toledo
Mechanical Engineering Technology /College of Engineering

MET 2120 – 004

Spring 2020

Instructors:	Dr. Carmen Cioc (lecture) and Mr. Eric Towell (labs)	Office Locations:	NE 1630 and NE 1620
Emails:	carmen.cioc2@utoledo.edu eric.towell@utoledo.edu	Office Phones:	419.530.3017 and 419.530. 3241
Office Hours:	Tuesdays: 9:30am – 11:30am (for Dr. Cioc) Tuesdays: 2:30pm – 4:30pm Wednesdays: 4:00pm – 5:00pm or by appointment	Class Location:	DL Online
		Class Day/Time:	DL Online
		Lab Location:	NE 1410
		Lab Day/Time:	R / 3:00 pm – 4:50 pm
		Credit Hours:	4 (3 Lecture & 1 Lab)

COURSE/CATALOG DESCRIPTION

Introduction to the study of stress distribution and deformation of elastic materials due to applied loads. Consideration of stress, strain, compression, tension, shear, torsion, moments and combined loading in basic machine elements.

COURSE OVERVIEW

The objective of this course is to provide the student with a basic understanding of the study of stress/strain distribution and deformation of elastic materials due to applied loads on beams and rods. Considerations will be given to the study of stress, strain, compression, tension, shear, torsion, moments, and combined loadings in basic machine elements.

STUDENT LEARNING OUTCOMES

At the end of the course the students will be able to:

- *Calculate simple stresses, normal and shear (LO1);*
- *Compute the deformations of axially loaded members (LO2);*
- *Identify and apply the mechanical properties of materials, like stiffness, elasticity, hardness, etc. (LO3);*
- *Calculate torsion of circular shafts (LO4);*
- *Calculate the shear and the bending moments in beams (LO5);*
- *Calculate the stresses in beams (LO6);*
- *Design steel beams (LO7);*
- *Calculate deflection in beams by at least two methods (LO8);*
- *Computing the load-carrying capacity of columns of different lengths and conditions (LO9);*
- *Design several types of connections for structural members (LO10).*

✓ **ABET STUDENT LEARNING OUTCOMES (Related Program Outcomes)**

(1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.

(2) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.



TEACHING STRATEGIES

This is an active, blended learning course that will require you to be fully engaged through the online Blackboard platform and the on-campus laboratory. This course is designed to stimulate learning through engagement and participation. I will give special assignments related to design problems. Please check the Course Expectation part for details about the course setup.

Recommendations for success:

- *Read the pages from the textbook on the material to be presented – it will help you focus on the lecture and to better understand the concepts;*
- *Read your notes and handouts;*
- *Redo on your own the practice problems discussed during the lectures;*
- *Try to do the assigned design problems alone; If you do not know how to do the homework, ask for guidance (email or Discussion Board);*
- *Actively participate to discussions posted on the Discussion Board and during the labs;*
- *Before a test: download the quizzes solutions, and make sure you go again through all practice problems, and solved examples from the textbook; ask for help if needed;*
- *If you do not understand something, there is a good chance that others have the same problem. Never be embarrassed to ask for help if you find something confusing;*
- *A professional attitude is expected at all time.*

PREREQUISITES AND COREQUISITES

Undergraduate level STATICS, MET 2100 with a minimum grade of D-

REQUIRED TEXTS AND ANCILLARY MATERIALS:

*STATISTICS + STRENGTHS OF MATERIALS, by Cheng, 2nd Ed, Publisher: MCG – **Required**
ISBN: 9780028030678*

TECHNOLOGY REQUIREMENTS

Web assist - Blackboard <https://blackboard.utdl.edu/> - to post solutions, announcements, etc.

The technical skills required to be successful in this course are: proficient in Blackboard and proficient in Excel.

To succeed in this course, it will be important for learners to possess the following technical skills:

1. *Rename, delete, organize, and save files.*
2. *Create, edit, and format word processing and presentation documents.*
3. *Copy, paste, and use a URL or web address.*
4. *Download and install programs and plug-ins.*
5. *Locate and access information using a web search engine.*
6. *Use a learning management system.*

Browser Check Page - *Students need to have access to a properly functioning computer throughout the semester. [The Browser Check Page](#) will enable you to perform a systems check on your browser, and to ensure that your browser settings are compatible with Blackboard, the learning management system that hosts this course.*

Internet Service - *High-speed Internet access is recommended; This course may contain streaming audio and video content.*

Use of Public Computers - *If using a public library or other public access computer, please check to ensure*



that you will have access for the length of time required to complete tasks and tests. A list and schedule for on-campus computer labs is available on the [Open Lab for Students](#) webpage.

UT Virtual Labs - Traditionally, on-campus labs have offered students the use of computer hardware and software they might not otherwise have access to. With UT's Virtual Lab, students can now access virtual machines loaded with all of the software they need to be successful using nothing more than a broadband Internet connection and a web browser.

The virtual lab is open 24/7 and 365 days a year at [VLAB: The University of Toledo's Virtual Labs](#).

Accessibility Policies

Blackboard - <https://www.blackboard.com/accessibility/index.html>

Microsoft - <https://www.microsoft.com/en-us/accessibility>

UNIVERSITY POLICIES

The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance](#).

Academic Accommodations

The University of Toledo is committed to providing equal opportunity and access to the educational experience through the provision of reasonable accommodations. For students who have an accommodations memo from Student Disability Services, it is essential that you correspond with me as soon as possible to discuss your disability-related accommodation needs for this course. For students not registered with Student Disability Services who would like information regarding eligibility for academic accommodations due to barriers associated with a potential disability, please contact the [Student Disability Services Office](#).

Policy Statement on Academic Dishonesty

As a reminder, "MISCONDUCT: Students may work together on homework problems or assigned papers, but must submit their own work. Students are not allowed to work together on exams". Any occurrence of academic misconduct will result in a grade of F in the course. Students that receive a reduced course grade as a result of academic misconduct will not be allowed to withdraw from the course and may not petition for a GPA recalculation after retaking the course. Please refer to the [Academic Dishonesty and Academic Grievance](#) policies for more details

Academic dishonesty will not be tolerated. Please read [The University's Policy Statement on Academic Dishonesty](#).

For Blackboard Privacy Policy, please check https://help.blackboard.com/Privacy_Statement

Copyright Notice

The materials in the course website are only for the use of students enrolled in this course for purposes associated with this course, and may not be retained or further disseminated.



COURSE EXPECTATIONS

Lecture: On Monday morning of each week I will post the class notes and a series of solved practice problems. Please read all the posted files under each module in the order they are presented. Start with Module Objective, and end with the Homework Submission.

Practice Problems: There is no homework assigned during this course, but consider redoing the posted practice problems as well as all the solved problems from textbook to better familiarize with the content knowledge and to practice problems to help you succeed in the examinations and weekly quizzes. The posted practice problems provides the necessary examples in order to gain mastery of the material.

Laboratories: This is a blended online & on-campus course, attendance will be taken during the laboratory sessions. For your success, besides discussing the content materials during the labs days, I recommend you to login several times per week and to collaborate with your classmates. Collaboration only in the form of shared knowledge, not excel files or solutions, is accepted. There are two discussion board forums. Both the Student Lounge and the Course Questions forums are dedicated for your daily interactions with your peers as well as your instructors. This is a group work, and only one laboratory report per group will be collected. During the first day of labs, you will be given an assigned partner(s) to work on the labs. These assigned groups will change during the semester, and you will have the opportunity to work with your peers, as well as evaluate their contribution to the group work.

Test: There will be three tests during the semester, all **taken on campus, during the labs days**. The practice problems provided each weekly module will help you prepare for the tests. You will receive my feedback on each of the test problems in less than 48 hours. Please check the Grading Criteria for details regarding the test grading. No collaboration is accepted for the test. In addition, NO personal laptops/tablets/ phones / smart watches are allowed during any examination. If you are found using any such device, you will automatically get a grade of **F** for the course and be considered for UT academic dishonesty regulations mentioned before. The final examination date and time may be found at:

http://www.utoledo.edu/offices/registrar/exam_schedules.html

Quiz: As a general rule, I will give you a short, 10-15 minute quiz every Thursday at the beginning of the lab period. The lowest quiz grade will be dropped when calculating the average. As mentioned before, NO collaboration is accepted during the quiz, and NO personal laptops/tablets/ phones / smart watches are allowed. If you are found using any such device, you will automatically get a grade of **F** for the course and be considered for UT academic dishonesty regulations mentioned before.

Note: *Most tests and quizzes are open book, except otherwise noted in class.*

COMMUNICATION GUIDELINES

It is all of our responsibility to foster an atmosphere of mutual understanding and respect. As your instructor, I am here to help, and I will do my best to respond to mail within 24 to 48 hours. Please use your @Rockets.UToledo.edu email address for all your email communications.

Email: Please check your UT email account frequently for important course information. If you have any issues with the material discussed or the laboratory exercise, please let me know and I will do my best to respond to your email within 24 hours.

Discussion: In this blended online – on campus course, participation is vital to your success, and your active engagement during weekly discussion and during the on campus laboratory exercises is crucial to learning. On Monday morning of each week, I will post the class notes and a series of solved practice problems. Try to engage in the discussion board. I will participate also in these spaces, and I will respond to discussion



questions within 24 to 48 hours.

Real-Time Communication: A link to a real-time communication or chat tool has been added to the Course Menu. We will not be using this tool as part of our course assignments; however, the tool is available for you to use if and when you need it. To that end, I would be happy to arrange a time to meet with you in a chat room if you feel that you have questions that would best be answered in real-time. Conversely, you could also use the tool to meet with fellow students online in order to enhance your understanding of course concepts.

Netiquette:

It is important to be courteous and civil when communicating with others. Students taking online courses are subject to the communication regulations outlined in the Student Handbook. To ensure your success when communicating online, take time to familiarize yourself with the “dos” and “don'ts” of [Internet etiquette](#).

GENERAL ACCESSIBILITY STATEMENT ON COURSE TECHNOLOGY

In conjunction with The University’s commitment to ensuring equal access to all technology-based information, this course contains technologies that learners can use regardless of age, ability, or situation. The course’s platform, Blackboard Learn, is a certified web-accessible platform, satisfying Level AA conformance criteria of Web Content Accessibility Guidelines (WCAG 2.0). External sites used in the course, such as Blackboard Ultra, are compliant with Section 508 standards, and the media players used in the course support closed captioning, are keyboard operable, and compatible with screen reading software.

GRADING Criteria

Strategy to Evaluate Each Problem from Test and Quiz	Allocated Points
90-100% of the steps (formulas) and calculations have no mathematical errors.	100 % of allocated points
Almost all (85-89%) of the steps and calculations have no mathematical errors.	75 % of allocated points
Most (75-84%) of the steps and calculations have no mathematical errors.	50% of allocated points
More than 75% of the steps and calculations have mathematical errors.	0%

Strategy to Evaluate the Laboratory Report	Allocated Points
Title Page & Table of Contents ○ Missing content	5 (max) 0
Objectives ○ Grammatical and typing errors	5 (max) 0
Theory & Required Formulas ○ Missing at least two formulas ○ Missing at least two formulas and units	20 (max) 10 0
Laboratory Procedures ○ Missing one step of the lab procedure description ○ Missing two or three of lab procedures steps ○ Missing more than three lab procedure steps	20 (max) 15 10 0
Results & Discussion ○ 90-100% of the steps and calculations have no mathematical errors ○ Almost all (85-89%) of the steps and calculations have no mathematical errors. ○ Most (75-84%) of the steps and calculations have no mathematical errors ○ Majority of the steps and calculations have mathematical errors	40 (maximum) 30 20 0
Conclusion ○ Conclusion not clear ○ More than 5 grammatical and typing errors combined	10 (max) 0 0
Total Points	100

The following parts will be considered when calculating the **final grade**:

Assignments/Assessments	% of Final Grade
5 Laboratory Exercises (5x100)	25
3 Tests (3x100)	50
8 Quizzes (8x100); lowest grade not considered	25
Total (1600 points)	100%

Midterm Grading - The midterm grading will be based on the same percentage as mentioned above, considering all the work done by that midterm date.

Final Grading

The final grade will be determined using a straight scale as follows:

Numerical Average	Grade
≥ 93.00	A
89.33 – 92.99	A–
85.67 – 89.32	B+
82.00 – 85.66	B
78.33 – 81.99	B–
74.67 – 78.32	C+
71.00 – 74.66	C
67.33 – 70.99	C–
63.67 – 67.32	D+
60.00 – 63.66	D
≤ 60.00	F



ACADEMIC AND SUPPORT SERVICES

Please follow this link to view a comprehensive list of Student Academic and Support Services available to you as a student:

<http://www.utoledo.edu/studentaffairs/departments.html>

Besides using my office for institutional support, the university offers additional support, like free tutoring or support, through:

- Engineering Technology Department - NE 1604 & NE 1606
- University of Toledo – Learning Enhancement Center - <http://www.utoledo.edu/success/lec/> or <http://www.utoledo.edu/studentaffairs/support.html>
- Disability Services Office <https://www.utoledo.edu/offices/student-disability-services/>
- Counseling Center <https://www.utoledo.edu/studentaffairs/counseling/>

SAFETY AND HEALTH SERVICES FOR UT STUDENTS

A comprehensive list of safety and health services available to you as a UT student, can be found at <http://www.utoledo.edu/offices/provost/utc/docs/CampusHealthSafetyContacts.pdf>

COURSE SCHEDULE (DRAFT)

Week	Module #	Lecture	Chapter	Quiz	Lab Topic	Learning Objective
1	Module 1	Review: Centroids, Moment of Inertia	7 & 8		Safety & Bridge Intro	
2	Module 2	Simple Stresses	9	√	Lab1: Bridge Design	LO1
3	Module 3	Strains	10	√	Lab1: Bridge Design (cont.)	LO2
4	Module 4	Mechanical Properties of Materials	11	√	Lab1: Bridge Design (cont.)	LO3
5	Feb. 20	Test 1			Done In lab	
6	Module 5	Torsion of Circular Shafts	12	√	Lab1: Bridge Test	LO4
7	Module 6	Shear Forces & Bending Moments in Beam	13	√	Lab2: Tensile Test	LO5
8		Spring Break – no classes				
9	Module 7	Stresses in Beams	14	√	Lab3: Torsion Test	LO6
10	March 26	Test 2			Done In lab	
11	Module 8	Design Beams for Strength	15			LO7
12	Module 9	Deflection of Beams	16	√	Lab 4: Bending test	LO8
13	Module 10	Columns	19	√	Lab 5: Column test	LO9
14	Module 11	Connections	20			LO10
15	April 30	Test 3			Done In lab	
16	4-May	Final Exam Week				