New Jersey Institute of Technology
Department of Engineering Technology
MET 237 Strength of Materials for Technology

COURSE NUMBER	MET 237
COURSE NAME	Strength of Materials for Technology
COURSE STRUCTURE	2-2-3 (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. J. Sodhi/ Dr. A. Sengupta
COURSE DESCRIPTION	Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structured problems, and an understanding of the mechanical behavior of materials under various load conditions. The laboratory experience is integrated within the course. Upon successful completion of this course, the students should be able to determine stresses and deformations for a variety of simple structural problems.
PREREQUISITE(S)	MET 235 or MECH 235
COREQUISITE(S)	None
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required
REQUIRED MATERIALS	Beer, Johnston, DeWolf, and Mazurek Mechanics of Materials, Eigth Edition, McGraw-Hill, ISBN: 9781260113273 Lab Manual (NJIT BOOKSTORE/ONLINE)
COMPUTER USAGE	Microsoft Office
COURSE OUTCOMES (CO)	By the end of the course students should be able to: 1. Determine stresses and deformations for a variety of structural problems. 2. Develop shear and bending moment diagrams for a variety beams. 3. Develop Mohr's Circle for a various states of plain stress or strain. 4. Determine the deflection of beams for simple loadings. 5. Determine the Euler buckling load for simple columns. 6. Determine the stresses in pressure vessels. 7. Analyze data and prepare laboratory reports.
CLASS TOPICS	Stresses, Strains, Displacement, Deformation, Statically Indeterminate Problems, Strain Energy, Temperature Change, Torsion, Flexural Stresses, Shear and Moment Diagrams Shear Stresses, Plane Stress and Strain Transformations, Mohr's Circle, Strain Rosette, Failure Criteria, Hooke's Law, Deflection of

Beams, Superposition, Columns. Pressure Vessels and Combined Loading

STUDENT OUTCOMES

The Course Outcomes support the achievement of the following Student Outcomes:

Student Outcome (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;
Related CO – 1 thru 6

Student Outcome (4)) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes;
Related CO – 7

Student Outcome (5) - an ability to function effectively as a member as well as a leader on technical teams;
Related CO – 7

GRADING POLICY

Homework	10 %
Quizzes (3 @ 15% ea.)	45 %
Final Exam	30 %
Laboratory	15 %

NOTE: GRADING POLICY MAY BE MODIFIED BY THE INSTRUCTOR

There are three quizzes during the semester. The lowest grade will be dropped. There will be no makeup tests – if you miss one test, then that is the test you will drop.

Homework sets are due one week after they are assigned. Late penalty is minus one problem grade. Assignments more than one week late will not be accepted.

- Homework must be submitted in sets, arranged in order as in the course outline.
- Homework must be written on quadrille 8½ x 11 engineering pad, one side only. Sets must be stapled together in the upper left-hand corner.
- Homework problems should done using the "Given and Find" format and all equations should be defined symbolically prior to calculating any values.
  DO NOT HAND IN class notes or scratch work.

ACADEMIC INTEGRITY

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree to which you are working. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy which is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

STUDENT BEHAVIOR	• No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories. • Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate. • No headphones can be worn in class. • Unless the professor allows the use during lecture, laptops should be closed during lecture.
MODIFICATION TO COURSE	The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.
PREPARED BY	Dr. A. Sengupta
COURSE COORDINATED BY	Dr. J. Sodhi

CLASS HOURS & LOCATION

Tuesday	6 – 7:55 PM	FMH 405
Tuesday	8:05 – 10 PM	COLT 422

OFFICE HOURS

By appointment only

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

GRADING LEGEND

GRADE	NUMERIC RANGE
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

LABORATORY SAFETY

Your safety and the safety of those around you are of prime importance. Efforts have been made to reduce the hazard in the lab as much as possible. If you should see anything that you consider to be a safety hazard report this condition to your lab instructor. Take your experiments seriously. Forces into the thousands of pounds will be used throughout the course and if these forces are released in an uncontrolled manner injuries are possible. Horseplay will not be tolerated and will constitute grounds for dismissal from the course.

LABORATORY REPORT

All reports should written using MSWord or Google Docs. Laboratory data will be supplied in spreadsheet format, and all graphs should be done using the same. The results of the experiment are the results you must work with. Draw your conclusions based on these results. If they are not as expected (you should have an idea of the expected results), account for the discrepancies.

Reports are also graded on your presentation. Is the material presented logically? Can all of the required results be found with ease? Are the results discussed intelligently, in good technical language? Can all the questions that enter the reader's mind be satisfied? Be advised that your discussion and conclusions will probably carry more weight than the production of the right answers.

You need to be present and participate when the lab experiment is conducted to receive credit for the report. All lab reports are due in two weeks after they were conducted. After the due date, reports will be accepted for 75% credit. After the reports have been graded, late reports will be accepted for only 50% credit. All lab reports must be submitted before the last lecture to get credit. A lab passing grade is required to pass the course.

LECTURE SCHEDULE:

Week	Date	Topics	Reading Assignment	Homework Assignment
1	9/2	Stresses and Strains	1.1 to 1.5	1, 4, 7, 64, 12, 29, 43, 5, 60
2	9/9	Strains, Displacement and Deformation, Hooke's Law, Statically Indeterminate Problems	2.1 to 2.8	4, 128, 19, 27
3	9/16	Statically Indeterminate Problems, Strain Energy, Temp. Change	2.1 to 2.8	130, 55, 50, 52, 60, 65
4	9/23	Torsion **Quiz #1**	3.1 to 3.4	3, 9, 21, 35, 38, 156, 51, 158
5	9/30	Flexural Stresses	4.1 to 4.5	1, 16, 12, 193,
6	10/7	Advanced Topics on Beams	4.1 to 4.5	24, 41, 49
7	10/14	Shear and Moment Diagrams	5.1 to 5.3	3, 6, 10, 19, 20, 21
8	10/21	Design of Prismatic Beams in Bending **Quiz #2**	5.1 to 5.3	156, 65, 71, 87
9	10/28	Shear Stresses	6.1 to 6.4	1, 3, 12, 18, 20, 40
10	11/4	Plane Stress Transformations, Mohr's Circle, General State of Stress, 3-D	7.1 to 7.5 7.7 to 7.9	5, 6, 15, 22, 31, 37
11	11/11	Failure Criteria, Plane Strain Transformations, Strain Rosette	7.1 to 7.5 7.7 to 7.9	5, 6, 15, 22, 31, 37
12	11/18	Columns **Quiz #3**	10.1	1, 9, 12, 11
13	12/2 (No class on 11/25)	Pressure Vessels and Combined Loading	7.6	99, 109, 108
14	12/9	Deflection of Beams, Superposition	9.1 to 9.2, 9.4	3, 1, 5, 16, 29, 100
	TBD	**FINAL EXAM**		

LABORATORY SCHEDULE:

Room: Colton Hall Rm #423

Week	Lab Topic
2 (9/9)	Introduction, Safety Procedures for Lab, Lab Reports, Using Spreadsheets for the Labs, Grading Policies
3 (9/16)	**Experiment 1:** Tension Test of Metals, Automated Testing
5 (9/30)	**Experiment 2:** Torsion Test of Metallic Materials
7 (10/14)	**Experiment 3:** Stresses, Strains, and Deflection of Steel Beams in Pure Bending
11 (11/11)	**Experiment 4**: Strain Measurements Using Strain Rosettes in Aluminum Beams
13 (12/2)	**Experiment 5:** Compression Test of Steel Columns