

DREXEL UNIVERSITY
Department of Mechanical Engineering & Mechanics

MEM 331: Experimental Mechanics I Syllabus – Winter 2021
(Ver. 1.0)

General Information

Web Site: Drexel Learn (MEM-331-A-WI 20-21)

Class hours: Monday, 02:00 pm - 02:50 pm, Blackboard Learn (i.e. Online only)

Prerequisites: MEM 230, MEM 238 (Co-Requisite)

Course Description: Covers statics, mechanics of materials and dynamic testing methods, including sensors and data acquisition, strain gauges and experimental stress analysis, tension and compression, torsion, bending, testing of mechanisms, and behavior of dynamic systems.

Instructor

Prof. Antonios Kotsos, ak866@drexel.edu, (215) 895 2297, Office hours: *Monday 12:00-1:00pm* on zoom (link to be provided on Blackboard Learn) or by appointment

Teaching Assistants

Emine Tekerek et432@drexel.edu, Vignesh Perumal vip23@drexel.edu and Aleksandr Plokhikh ap3249@drexel.edu; Office hours: *Monday 12:00-1:00pm (AK)*, *Wednesday 4:00-5:00pm*, *Thursday 4:00-5:00pm* on zoom (link to be provided on Blackboard Learn) or by appointment

Lab hours

Section	CRN	Time	Location	Lead TA
61	20235	F 8:00am – 9:50am	Blackboard	Emine
62	20134	F 10:00am – 11:50am	Blackboard	Emine
63	20483	F 12:00pm – 01:50pm	Blackboard	Vignesh
64	21188	F 2:00pm – 03:50pm	Blackboard	Aleksandr

Textbook(s) and other required material: Laboratory manuals, pre-labs, and other necessary handouts will be available for download.

Course Objective

1. Familiarize the student with laboratory testing equipment used in experimental mechanics.
2. Use laboratory equipment to demonstrate the mechanical behavior of engineering materials.
3. Apply analytical models to describe the mechanical behavior of materials and motion of dynamic systems.
4. Analyze experimental data and correlate experimental results to analytical models.
5. Enhance technical report writing as well as experimental data and analysis presentation skills.

Course Policies

Attendance

It is the student's responsibility to attend the online lecture and use the covered material in laboratory reports. Online laboratory attendance is mandatory. If you are absent from a laboratory session, justification must be provided within one (1) week from the absence. There will be no make-up laboratory sessions unless the instructor approves one during the same week of absence.

Grading

- Each experiment has a Pre-Lab that must be completed before the laboratory session. The Pre-Lab assignment can be found on the last page of each Lab Manual. Submit this on Blackboard at the beginning of your corresponding lab sessions (20% of the grade).
- Lab reports must be written following the prescribed format that can be found in the syllabus (70% of the grade).
- Lab reports are due on Blackboard at the beginning of your lab session the week after the lab is completed. Lab reports must be uploaded at the beginning of the lab session.
- A lab report submitted after the due date will not receive full credit.
- Term grade is based on lab report scores (includes pre-laboratory assignment submitted prior to performing experiment), class participation, and lecture attendance. There is no final exam.
- All questions about a graded assignment must be brought to the attention of the instructor and/or TA within 1 week after receiving the graded assignment.
- Overall grading structure: 20% Prelab; 70% Lab Reports; 10% Quizzes and Assessment.

Laboratory Structure

For all lab sessions students are divided into groups of groups of 3-5 students per group. You will keep the same group for the entire term. The table below indicates the schedule of laboratory activities for the course's duration. This schedule is subject to change.

Week	Date	Course Content
1	01/11	Extra Lecture (Synchronous): The role of Mechanics in <u>Engineering Design</u> Lab #1: Truss Experiment
2	01/18	Martin Luther King, Jr. Day (No Class) Extra Lecture (Asynchronous): The role of <u>standards and Design of Experiments</u> in Experimental Mechanics. Data analytics and Uncertainty Quantification in Experimental Mechanics No Labs
3	01/25	Lab #2: Axial Loading Experiment
4	02/01	Lab #3: Bending Loading
5	02/08	Lab #4: Combined Loading
6	02/15	Lab #5: Torsion Loading
7	02/22	Extra Lecture (Synchronous): The use of <u>Sensing and Nondestructive Testing & Evaluation (NDT&E)</u> in Experimental Mechanics No Labs
8	03/01	Lab #6: Centripetal Force
9	03/08	Extra Lecture (Synchronous): Connection between Experimental & Computational Mechanics Simulation-based Engineering Lab #7: Ballistic Pendulum

Lab Report Format

1. **Abstract (5 points).** A short description of what was done and the major result(s) and conclusion(s). The following questions should be answered in the abstract: What were you trying to find out by doing the experiment? What did you do in the experiment? What were your results? A sentence or two for each question is enough.
2. **Introduction (10 points).** This section tells the reader why you did the experiment. It includes some or all of the following: background information, possible results based on theory, and/or an explanation of any difficulties you thought you would encounter initially. When the reader finishes reading the introduction, he/she should know what to expect in the report.
3. **Experimental Procedure (5 points):** This section describes your procedure in enough detail that someone else with your level of experience could repeat the experiment. Your description must be quantitative, such as to include: the materials you used, how to setup the experiment, how the experiment was run.
4. **Results (50 points):** In this section you present the data from your experiment. You may use tables and/or figures to present the results, but you should describe any relevant features of the results completely within the text, referring the reader to the appropriate table or figure as necessary. Keep in mind that tables are useful when the reader wants to know the exact numerical value of a result, while graphs are useful for showing trends. Both tables and figures should be numbered sequentially, and each should have a descriptive title.
5. **Discussion (15 points):** This is the section where you explain to the reader the significance of the results you presented above. Your discussion will include some or all of the following: comparison between your results to others in the class, evaluation of how your data support or refute your original hypothesis, future application of information/skills learned, and analysis of possible sources of error.
6. **Conclusions (5 points):** This is a brief summary of the main conclusion(s).
7. **References (5 points):** List here all citations that you used. Please use related instructions.
8. **Format (including professional written): (5 points)**

Tables may be presented in a format that clearly delineates rows and columns from each other. Headings should indicate the units associated with any value.

Figures may include any graphic information such as drawings of experimental apparatus, and graphs of the data acquired during experiment. The same instructions apply to graphs as to the rest of your report: present the material in the simplest and clearest manner possible.

More details for report format you will have in a separate document in Drexel Learn.

Grading Scale

Final grades will be based on the following scheme:

Numerical Score	Point Equivalent	Letter Equivalent	Numerical Score Used for Letter Grades and Overall Grade Calculations
97-100	4.00	A+	100.0
94-96	4.00	A	95.0
90-93	3.67	A-	91.5

87-89	3.33	B+	88.0
84-86	3.00	B	85.0
80-83	2.67	B-	81.5
77-79	2.33	C+	78.0
74-76	2.00	C	75.0
70-73	1.67	C-	71.5
67-69	1.33	D+	68.0
64-66	1.00	D	65.0
60-63	0.67	D-	61.5
< 60	0.00	F	0.0

Academic Integrity, Plagiarism and Cheating

All students are expected to abide by Drexel University’s Student Conduct and Community Standards and Academic Integrity policy. Drexel defines cheating as an act or an attempted act of deception by which a student seeks to misrepresent that he or she has mastered information on an academic exercise that he/she has not mastered. Examples include, but are not limited to:

- Copying from another student’s work
- Allowing another student to copy from a student’s own work
- Unauthorized use of textbook or other materials, such as a notebook to complete a test or other assignment from the faculty member
- Collaborating on a test, quiz, or other project with any other person(s) without authorization
- Using or processing specifically prepared materials during a test such as notes, formula lists, notes written on the students clothing, etc. that are not authorized
- Taking a test for someone else or permitting someone else to take a test for you

If an act of academic dishonesty is determined to have occurred, it will be reported to the MEM Academic Advisors, and one of the following sanctions may be imposed:

- Reduction of the overall course grade
- A zero (0) for the assignment or exam
- Failing grade (F) for the entire course with the inability to withdraw, or
- Other action deemed appropriate by the faculty member, such as requiring the student to re-take the exam or re-do an assignment

The decision of the faculty member and the department head shall be reported to the Office of Judicial Affairs, which is responsible for maintaining student conduct records. The incident will result in an official disciplinary record for the student, and the Office of Judicial Affairs may choose to levy other sanctions. Please follow these links for a complete description of the University’s policies regarding student conduct and academic integrity: http://www.drexel.edu/studentlife/community_standards/overview/ and http://www.drexel.edu/provost/policies/academic_dishonesty.asp

Course and Syllabus Changes

While every attempt has been made to make this syllabus complete and accurate, the instructors reserve the right to change the policies, schedule, or course material as necessary. Students will be notified of any changes in a timely manner

Add/Drop and Withdraw Policies

June 26th is the last day to Add/Drop a course with Academic Advisor assistance, and June 28th is the last day to Add/Drop a course via DrexelOne. Please refer to the following links for information regarding dropping or withdrawing from this (or any other) course.

Add/Drop - <http://drexel.edu/provost/policies/course-add-drop/>

Withdrawal - <http://drexel.edu/provost/policies/course-withdrawal/>

Students with Disabilities

Students with disabilities requesting accommodations and services at Drexel University need to present a current accommodation verification letter (AVL) to faculty before accommodations can be made. AVL's are issued by the Office of Disability Resource (ODR). For additional information, contact ODS at www.drexel.edu/ods, 3201 Arch St., Street, Suite 210, Philadelphia, PA 19104, 215.895.1401 (V), or 215.895.2299 (TTY).