

MTEN 206 MTEN Laboratory II

Credits and contact hours

0-2-1 (0 lecture hr/wk-2 hr/wk-1 course credit)

Wednesday: 11:30 am – 1:25 pm

MTEN teaching laboratory

<https://njit.webex.com/meet/molodetsnjit.edu>

Instructor: Irina Molodetsky

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Textbook

Hosford, William F.. Mechanical Behavior of Materials, Cambridge University Press, 2009.
ProQuest Ebook Central,

<http://ebookcentral.proquest.com/lib/njit/detail.action?docID=472008>

Materials required for specific laboratory assignment will be distributed to the students

Specific course information

a. Description:

Students will get acquainted with ASTM, measure mechanical properties of different metals (and metal-alloys), polymers, ceramics and composites, observe effects of the coupling mechanical and thermal stresses, and perform macrostructural analysis of the mechanical failures.

Prerequisites: MTEN 201, MTEN 202

Co-requisites: MTEN 205

b. Required, Elective, or Selective Elective – Required

Specific goals for the course

a. The student will be able to:

1. Learn and apply materials laboratory safety rules and acquire hands-on experience with the metallographic techniques and mechanical testing
2. Identify relevant standard testing procedures and specify the requirements for a sample and test configuration
3. Work effectively in a team, assume various responsibilities, create supportive and collaborative environment for each team member
4. Perform mechanical testing and use microscopy to document and identify types of mechanical failures
5. Collect data, analyze and interpret data, leading to structure-property relationships
6. Report data and present data analysis in a manner consistent with the assigned reporting structure

Topics

1. Metallographic sample preparation techniques. Hands-on experience with the mounting, cutting, grinding, polishing and etching.
2. Optical microscopy as a materials macrostructure characterization technique. Documenting and professional image presentation. (Laboratory experiment #1. Report+Presentation)
3. Operate mechanical testing equipment to obtain an engineering and true stress-strain curve, identify different types of deformation and key mechanical properties
4. Establish structure-property relationship in metals: mechanical properties of different metals before and after annealing (Laboratory experiment #2. Report)
5. Establish structure-property relationships in polymers: measure Young's modulus on various polymers with the different number of covalent bonds; with the varied degree of crystallinity and propose an empirical model (Laboratory experiment #3. Report)
6. Perform hardness testing of the silicone composites with the various filler types content (Laboratory experiment #4. Presentation)
7. Joining of materials with different mechanical properties and CTEs. Microscopy characterization of a brazed assembly. (Final Presentation)

Course Structure

1. Laboratory experiments are completed either individually or in a team.
2. There are four laboratory experiments and a final project presented at the end of the semester.

Communication

1. This course will use the NJIT Canvas site accessed by <http://canvas.njit.edu> for all communications regarding changes in the schedule, status of the experiments, score rubrics, files and documents.
2. All online communications are done on webex <https://njit.webex.com/meet/molodetsnjit.edu> unless other address is specified
3. Additional online individual or team discussions will be scheduled on Canvas and require you to sign up to a specific slot.
4. If circumstances require online communication with the entire class, it will be done through **Webex** hosted by the instructor

Grading

Above 90 A
Above 85 B+
Above 80 B
Above 75 C+
Above 70 C

Above 60 D
Below 60 F

Professional Behavior

- You are expected to follow the laboratory safety standards.
- 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 that you are working on. 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 that is found at:

<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. *Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.* If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu”

www.njit.edu/academics/pdf/academic-integrity-code.pdf

Accommodations due to a disability

If you need accommodations due to a disability please contact Marsha Williams-Nicholasto, Associate Director of Disability Support Services, Kupfrian 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.