

MTEN 201-003

Introductory Principles of Materials Engineering

Fall 2025 Syllabus

**Instructor:** Dr. Irina Molodetsky

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Office: 350 Tiernan Hall

Office hours: Tuesday 1:30 pm – 4:30 pm. Additional office hours - schedule via email.

**Teaching Assistant:** Shima Baloochestanzadeh (sb2936@njit.edu)

**Required eTextbook** (Online Subscription required): Wiley PLUS: Fundamentals of Materials Science and Engineering. An Integrated Approach, 6<sup>th</sup> Edition. W.D.Callister, Jr., and D.G.Rethwisch, John Willey and Sons, Inc.

ISBN:

9781119764816 ~ WileyPLUS one-term access

or

9781119750499 ~ WileyPLUS one-term access + loose leaf text

**Class schedule:** Monday, Friday: 10:00 am-11:20 am

**FMH 313**

**Course:** This course introduces the basic concepts of Materials Engineering, and covers introductory topics including structure, property, performance, and processing of materials. This course focuses on conventional materials including metallic materials and their alloys, ceramics, polymers, and composites. Relationship between structure and material properties, such as mechanical, electronic, thermal, optical, magnetic, and electrochemical, are investigated with a particular interest on ways to engineer material structures to produce desired set of properties. Broader themes associated with the property, processing and performance of materials that influence the economy, environment, and society are discussed.

**Prerequisites:** CHEM 126, PHYS 121 or PHYS 122, MATH 112

**Course Administration:** Administration of this course will be done through Canvas

Assignments	10%	Includes problems from Wiley eBook
Quizzes	20%	Based on the written assignments and questions discussed in class
Exam 1	20%	
Exam 2	20%	
Final Exam	30%	Cumulative exam
Weekly exit questions related to the topics discussed in class that week	EXTRA CREDIT	Will add 5 points to that week's homework assignment score. The best question for the week (as determined by the instructor) will receive 10 points to the week's homework assignment.

**Makeup Policy:** No makeup of any homework or in-class assignments will be granted unless the Dean of Students contacts me about your reason for missing and the reason is deemed suitable.

**Grading:**

A: 90 and above  
B+: 85 and above  
B: 80 and above  
C+: 70 and above  
C: 60 and above  
D: 50 and above  
F: below 50

**Electronic Device Policy:** With the exception of calculators, the use of electronic devices during exams, finals, or quizzes is prohibited. The use of an electronic device during class time is allowed and you are encouraged to bring a personal electronic device to class to participate in Slido questions and access your WileyPLUS materials. Please be aware, however, that though these devices can aid in your learning experience, they can also be a source of distraction for both you and your peers. Use your electronic devices responsibly so as not to distract yourself or others from the class.

**Academic Integrity Policy:** *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:*

<https://t.e2ma.net/click/zzkslnb/fwo9novf/bpod05x>.

*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](mailto:dos@njit.edu).*

**Use of “homework help” sites such as Chegg.com to complete class work is prohibited.** Any student found to have used one of these sites on an assignment will be reported to the Dean of Students Office for a potential academic integrity violation.

**Generative AI policy.** This course expects students to work without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted throughout this course under any circumstance.

**Disability Support Services.** If you need any accommodation due to a disability, please contact Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodation will be required.

**All Quizzes and Exams are closed notes/books.** A sheet with the reference equations, expressions, constants and other relevant information will be provided by instructor.

**Course Objectives.**

Students will be able to:

1. name types of bonding in materials and identify which materials exhibit each of these bonding types
2. identify the structures of metals and ceramics
3. identify the chemical and structural characteristics of polymers
4. define types of imperfections and the roles they play in affecting the behavior of materials
5. design structures/components using predetermined mechanical properties and mechanical constraints and/or safety constraints
6. identify deformation and strengthening mechanism for materials
7. interpret phase diagrams for determination of phases present and computation of phase compositions and amounts
8. apply phase diagrams for development of microstructures in alloys
9. apply phase transformations concepts to determine microstructure
10. draw relationship between microstructure and mechanical properties
11. select appropriate materials for various applications
12. identify economic, environmental and societal issues in materials design and selection

**Topics and dates** (may be subject to change):

1. Introduction (Ch.1)
2. Atomic Structure and Interatomic Bonding (Ch.2)
3. The Structure of Crystalline Solids (Ch.3)

**QUIZ #1 Monday, September 22**

4. Polymer Structures and properties (Ch.4, 11)

**EXAM #1 Monday October 6**

5. Imperfections in Solids (Ch.5)
6. Mechanical properties (Ch.7)

**QUIZ #2 Monday October 20**

7. Dislocations and Strengthening Mechanisms (Ch.8)

**EXAM #2 Monday, November 3**

8. Phase Diagrams (Ch.10)

**QUIZ #3 Monday November 17**

9. Phase transformations (Ch.11)

**QUIZ #4 Monday December 1**

10. Economic, Environmental and Social Issues (Ch.20) – **joint sections**

December 12 **READING DAY**

**Final Exam – To Be Scheduled – will take place during Dec 14-Dec 20**