

## MTEN613, Characterization of Materials

NJIT, Spring 2025 Syllabus

1/19/2025

**Time and Location:** Thursday, 6pm-9pm --- Mechanical Engineering Dept. 221

**Instructor:** Mirko Schoenitz,

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Course materials: canvas.njit.edu

“Office hours”

Mo-Fr 10am-5pm in person (YCEES 218), or by phone, or via Zoom;

I will be available with 24 h notice – I may be available on shorter notice.

### **Books:**

**(recommended, available electronically at NJIT library)**

- *Materials Characterization, Introduction to Microscopic and Spectroscopic Methods*, Leng, Y., Wiley, 2013:  
[https://primo.njit.edu/permalink/01NJIT\\_INST/dcbe8h/alma994911658605196](https://primo.njit.edu/permalink/01NJIT_INST/dcbe8h/alma994911658605196)
- *ASM Handbook Vol 10: Materials Characterization (2019 Edition)*:  
[https://primo.njit.edu/permalink/01NJIT\\_INST/dcbe8h/alma992240273405196](https://primo.njit.edu/permalink/01NJIT_INST/dcbe8h/alma992240273405196)

**(also useful)**

*Materials Characterization Techniques*, Zhang, S., Li, Lin., Kumar, A., CRC Press, 2009

*Introduction to the Principles of Materials Evaluation*, Jiles, D.C., CRC Press, 2008

**Grading:** Two exams (30 % each), research presentation (30 %), weekly assignment (10 %)

Date	Topics	Assigned reading
23-Jan	Introduction/Overview: materials structure and matter-radiation interactions	--
30-Jan	Electron Microscopy I: SEM, Microanalysis	Zhang Ch. 7, Leng Ch. 4 & 6
6-Feb	Electron Microscopy II: TEM	Leng Ch. 3
13-Feb	Surface Analysis: XPS, AES	Zhang Ch. 3 (+Ch. 2)
20-Feb	Probe Microscopy: STM, AFM	Zhang Ch. 4
27-Feb	Diffraction I: XRD, Phase ID	Zhang Ch. 5
6-Mar	Diffraction II: Phase Analysis, Rietveld	TBA
	(research paper selection for presentation is due)	
13-Mar	Midterm	
27-Mar	Vibrational Spectroscopy: IR, Raman	Leng Ch. 9
3-Apr	Thermal Analysis I: Fundamentals	Zhang, Ch. 10
10-Apr	Thermal Analysis II: Kinetic analysis	TBA
17-Apr	Mechanical testing	TBA
24-Apr	Research Presentations 1	
1-May	Research Presentations 2	
15-May	Final	

**Academic Integrity:**

Exams will be open-book, open-notes, but strictly without electronic devices. For everything else, including homework, collaboration is greatly encouraged.

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: NJIT Academic Integrity Code.

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).