

Survey of Materials Analysis Techniques

EMA 6510 Section CAMP, WEBR, 1FE2, 2FED

Class Periods: T 7 (1:55pm-2:45pm), R 7-8 (1:55pm-3:50pm)

Location: WEIM 0273 (T), CSE E221 (R); Canvas (EDGE student)

Academic Term: Fall 2025

Instructor:

Honggyu Kim

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(352) 846-3766

Office Hours: Monday (4:00-5:00pm EST), 168 Rhines Hall or by appointment via Zoom (link will be accessed through Canvas)

Class Website: Login to e-learning at elearning.ufl.edu

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

N/A

Course Description

Principles and techniques used in characterization of materials. Chemical, microstructural, electronic structure, and surface analysis of materials; metals, ceramics, polymers, and semiconductor systems. 3 credits

Course Pre-Requisites / Co-Requisites

EMA3010 or equivalent

Course Objectives

- Grasp the principles and theory for general materials characterization techniques
- Understand the instrumentation requirement, set-up, and performance capabilities and limitations of materials characterization techniques
- Develop characterization solutions to practical materials characterization needs

Materials and Supply Fees

N/A

Required Textbooks and Software

- Encyclopedia of Materials Characterization: Surfaces, Interfaces, Thin Films, Ed. C. Richard Brundle, Charles A. Evans, Jr., and Shaun Wilson, 1992 by Butterworth-Heinemann (ISBN 978-0750691680). Electronic book available from ScienceDirect (with UF user authentication):
<http://www.sciencedirect.com/science/book/9780080523606>
- Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, by Y. Leng (2nd Ed.), 2013 by Wiley & Sons (ISBN 9783527334636). Electronic book available (with UF user authentication):
<https://ebookcentral.proquest.com/lib/ufl/detail.action?docID=7104670>

Recommended Materials

- Introduction to the Physics and Chemistry of Materials, by Robert J. Naumann (available online:
<https://doi.org/10.1201/9781420061345>)

Required Computer

Recommended Computer Specifications: <https://it.ufl.edu/get-help/student-computer-recommendations/>

HWCOE Computer Requirements: <https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/>

Course Schedule

Tentative topics to be covered (subject to change):

- Optical Microscopy
- Scanning Electron Microscopy
- Transmission Electron Microscopy
- Atomic Force Microscopy
- Scanning Probe Microscopy
- Electron Spectroscopy
- Optical Spectroscopy
- Ion Techniques
- X-ray Techniques
- Other Techniques (Neutron Diffraction, LEED, RHEED)

Detailed lecture schedule to be introduced in Week 1.

Important Dates

Oct.14.2025, Tue **Exam 1 (Time, Location TBD)**

Dec.02.2025, Tue **Exam 2 (Time, Location TBD)**

- The schedule above is **tentative, subject to change**.
- Any changes to the exam schedule will be announced at least one week prior
- Instructions on exam will be announced at least one week prior

Attendance Policy and Class Expectations

Experience has shown that discussions and Q/A during the live lecture improve the student's understanding of the course materials. Therefore, lecture attendance is highly recommended. Attendance will not be required except for the final presentation in which students will ask questions and grade their peers. Students are expected to **be punctual** on every lecture and **behave respectfully** to their peers and the instructor. All the electronic devices should be in silence mode and especially **the use of cell phones is prohibited**.

Make-Up Policy

Makeup exams will be provided only if students have a valid reason (e.g., medical absences, family emergency, etc.). Excused absences must be consistent with university policies in the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/graduate/regulations>. If students are not able to take exams, students must inform the instructor at the earliest opportunity.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (~7)	10 each	30 %
Exam (2)	100 each	50 %
Presentation (1)	10	20 %
Total		100%

Late assignments: Late submission of homework sets is **not allowed**. Late assignments will be counted as **ZERO**.

Grading Policy

Percent	Grade	Grade Points
≥ 92	A	4.00
≥ 88	A-	3.67
≥ 84	B+	3.33
≥ 80	B	3.00
≥ 76	B-	2.67
≥ 72	C+	2.33
≥ 68	C	2.00
≥ 65	C-	1.67
≥ 62	D+	1.33
≥ 59	D	1.00
≥ 56	D-	0.67
< 56	E	0.00

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: <https://go.ufl.edu/syllabuspolicies>. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Coordinator
- HWCoe Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu