

Course Syllabus
EMA 6510: Survey of Materials Characterization Techniques
Fall 2014
Sections: 05F6 (non-EDGE); DEPT (EDGE)

1. Catalog Description (3 credits): Principles and techniques used in characterization of materials. Chemical, microstructural, and surface analysis of materials; metals, ceramics, polymers, and semiconductor systems.
2. Pre-requisites: EMA3010 or equivalent
3. Course Objectives:
 - a. Grasp the principles and theory for general materials characterization techniques
 - b. Understand the instrumentation requirement, set-up, and performance capabilities and limitations of these materials characterization techniques
4. Instructor: Dr. Jiangeng Xue
 - a. Office location: 180 RHN
 - b. Telephone: 846-3775
 - c. E-mail address: jxue@mse.ufl.edu
 - d. Class Web site: <https://lss.at.ufl.edu/> (e-Learning in Sakai)
 - e. Office hours: Wednesdays 1:50-2:50 pm
5. Teaching Assistant: N/A
6. Meeting Times: MWF 12:50-1:40pm (6th period)
7. Class/laboratory schedule: 3 classes per week
8. Meeting Location: CSE E122
9. Material and Supply Fees: \$24 (Section 05F6) or \$270 (Section DEPT)
10. Textbooks and Software Required

Encyclopedia of Materials Characterization: Surfaces, Interfaces, Thin Films
(Materials Characterization Series).
Eds: Brundle, C. R., Evans, C. A. Jr., Wilson S. 1992.
Publisher: Butterworth-Heinemann
ISBN-13: 978-0750691680

Electronic book available from ScienceDirect (with UF user authentication):
<http://www.sciencedirect.com/science/book/9780080523606>
Course Reserve item in Marston Science Library: TA418.7 .B73 1992
11. Recommended Reading:
 - a. Characterization of materials, by John B. Wachtman, with chapters on X-ray methods by Zwi H. Kalman (Course Reserve item in Marston Science Library: TA410 .W23 1993)
 - b. Characterization of materials, by Elton N. Kaufmann (Course Reserve item in Marston Science Library: TA404.2 .K38 2003)
 - c. The Physics and Chemistry of Materials, by Joel I. Gersten and Frederick W. Smith, Chapter 22 – Characterization of Materials (available online: ftp://ftp.wiley.com/public/sci_tech_med/materials)
12. Course Outline

The topics listed below may be subject to change and be presented in a slightly different order.

LECTURE TOPICS
Introduction
Optical Microscopy (OM)
Scanning Electron Microscopy (SEM)
Transmission Electron Microscopy (TEM)
Optical and Stylus Profilometry
Atomic Force Microscopy/Scanning Probe Microscopy (AFM/SPM)
Energy/Wavelength Dispersive Spectroscopy (EDS/WDS)
Electron Energy Loss Spectroscopy (EELS)
X-Ray Fluorescence (XRF)
Auger Electron Spectroscopy (AES)
X-Ray and Ultraviolet Photoelectron Spectroscopy (XPS/UPS)
Secondary Ion Mass Spectrometry (SIMS)
Photoluminescence (PL), Absorption/Transmission Spectroscopies
Fourier Transform Infrared Spectroscopy (FTIR)
Raman Spectroscopy
Ion Scattering Spectroscopy (ISS) and Inductively Coupled Plasma Mass Spectrometry (ICPMS)
X-Ray Diffraction (XRD)
SAXS, GIXD, GISAXS, XRR
Electron Backscatter Diffraction (EBSD)
Neutron Diffraction and Neutron Reflectivity

13. Attendance and Expectations: attendance strongly encouraged.

Sections of this course are offered on UF EDGE. Lectures will be recorded, and the lecture videos are available on the UF e-Learning (Sakai) website for all students (not just those who registered for the EDGE section) to review at any time. However attendance is strongly encouraged for all non-EDGE students to enhance classroom learning and interaction. Special conditions for absence will be accepted only with prior approval by the instructor

14. Grading:

Exam 1:	25%
Exam 2:	25%
Exam 3:	25%
Homework:	25%

15. Grading Scale: Final letter grade will be assigned based on a student's overall performance during the semester. The following scale will be used as a guideline: A(100-92), A-(91-88), B+(87-84), B(83-80), B-(79-77), C+(76-74), C(73-71), C-(70-68), D+(67-65), D(64-62), D-(61-60), E(59-0)

“Graduate students need an overall GPA of 3.00 truncated and a 3.00 truncated GPA in their major (and in the minor, if a minor is declared) at graduation.” For more information on grades and grading policies, please visit:

<http://gradcatalog.ufl.edu/content.php?catoid=4&navoid=907#grades>

16. Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>
Except for emergencies, make-up exams are only allowed if requested at least one week before the regular exam time AND approved by the instructor. Make-up exams will differ from regularly-scheduled exams.
17. Honesty Policy – UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code
(<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.
- Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.
See <http://www.dso.ufl.edu/sccr/procedures/honorcode.php>
18. Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.
19. UF Counseling Services –Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575,
<http://www.counseling.ufl.edu/cwc/Default.aspx>, counseling services and mental health services.
 - Career Resource Center, Reitz Union, 392-1601, career and job search services.
University Police Department 392-1111
20. Software Use – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.
21. Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.