

Course Syllabus
EMA 3013C Materials Laboratory 2
Spring 2015

1. Catalog Description (2 credits): General undergraduate materials laboratory.
2. Pre-requisites and Co-requisites:
EMA3080C
3. Course Objectives: Students will develop skills to conduct experiments, analyze data, and communicate results for major concepts in Materials Science.
4. Contribution of course to meeting the professional component: This is a 2 credit course.
5. Relationship of course to program outcomes: This course addresses the following MSE Program outcomes(note: Numbers refer to the list of MSE Program outcomes):
 1. Ability to apply knowledge of mathematics, science, and engineering to materials systems. This course requires for the students to assess and calculate material parameters from data obtained experimentally. Device structures that are produced in the laboratories will be tested to see if certain device performance requirements are satisfied. (HIGH)
 2. Ability to conduct experiments, analyze and interpret data. For this course, the students will have to follow instructions, set-up experiments, collect data and interpret data, and discover any sources of error. (HIGH)
 3. Ability to conduct and analyze design of experiments (DOE). The students will be exposed to a simple experiment, identify the control variables, the uncontrolled variables and asked to expose sources of error and solutions to those sources.
 4. Ability to apply and integrate knowledge of structure, properties, processing, and performance to solve materials selection and design problems within realistic constraints. The students will be asked to compare the published material property values with the experimentally obtained values and give reason for any discrepancies. (MEDIUM)
 6. Ability to identify, formulate, and solve engineering problems. The students will be asked to provide realistic solutions to issues associated with the material processing and material testing to improve the experimental data sets. (HIGH)
 7. Understanding of professional and ethical responsibility. The students will be placed into laboratory groups and will be asked to grade their peer's performance within the group. (HIGH)
 8. Ability to communicate effectively in both oral and written form. The students will have to submit a written laboratory report for each laboratory. These will be graded on both technical content and clarity. (HIGH)
 13. Ability to use the techniques, skills, and tools needed for practice as a materials engineer. The course provides students with hands on laboratory experience in the field of electronic materials testing and processing. This knowledge will be applicable in either the academic arena or the industrial arena.(HIGH)
6. Instructor: Dr. Nancy Ruzycki
 - a. Office location: RHN 150
 - b. Telephone: 352.846.2991
 - c. E-mail address: nruzycki@mse.ufl.edu
 - d. Office hours: Wednesday or Thursdays 4-5th period, or by appointment
7. Teaching Assistant: Ethan Kennon, Lindsey Mullenix, Joseph Ault Office hours TDB
8. Meeting Times: Monday 5th period FLG 0220
MTWR Labs 7-9th period
9. Class/laboratory schedule: lecture once a week for one hour, laboratory once a week for three hours.
10. Meeting Location: Lecture – FLG 0220 Lab – Rhines 115 or 141
11. Materials and Supply Fees: See UF ISIS website for course fee for laboratory.

12. Textbooks and Software Required: none required, recommended SciLab, MATLAB, CrystalMaker

13. Recommended Reading: Callister

14. Course Outline - Below is the tentative schedule of topics, activities, reading assignments, exams, and homework. See Sakai for Chapter and Unit Objectives, Learning Outcomes, assignments, and rubrics. This outline is subject to change.

There may be changes/substitutions to the laboratories listed below, depending upon available equipment, and student progress.

Laboratory	Weeks	concepts	skills	Student product
Composites	2-3	Types of composites, reinforcing phase, matrix phase, anisotropic material, composite factors vs properties vs mechanical performance, specific modulus, critical load, specific strength, stiffness, fracture toughness, advantages and disadvantages, balanced laminates, maximum stress criteria,	Fracture toughness, three point bending, fiberglass wrapping, carbon fiber skinning	Fiberglass tube, carbon fiber cell phone case, technical report on fiberglass tube experiment, lab notebook
Failure Analysis	3	brittle/ductile fracture, properties of brittle materials, Fractography, indentation fracture toughness, ductile- brittle transition, crazing, stress-strain diagrams, Weibull Statistics	Stress-strain diagrams, Charpy Impact test, three point bending, Scanning Electron Microscope	Case Study analysis, student selected case study presentation, Student case study on failed material, Lab notebook
Electronic Materials lab	2	Electronic materials, polymer electronics, printable electronics, band diagrams, doped materials, small PN(NP) devices, making an LED, OLED or Solar Cell	Preparation of electronic devices, efficiency measurements, Ohm's law	Lab notebook, technical memo on selected device
Polymer degradation and kinetics lab	2 + ongoing	degradation, compression, mesh, kinetics, wear, corrosion, porosity, polymer crosslinking, diffusion	UV cross linking of polymers, drug delivery methods, assay for protein, diffusion	Lab notebook, questions and graphs from lab
Dielectric materials ceramics lab	4	Electronic properties, ceramics processing and characterization	Sintering, mechanical processing, XRD, Dielectric measurements	Experimental design proposal, weekly update reports, peer grading, Oral presentation of experimental result, group information

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Each Topic will have a student product which will be graded as a formal assessment. There will be a rubric for each product. Student products may include, but are not limited to; lab reports, posters, abstracts, research proposals, users manuals, program codes, technical letters, oral presentations.

15. Attendance and Expectations - Attendance is **strongly** suggested since significant amount of participative as well as individual and collaborative work will be performed during the class sessions and will be worth as greater than 20% of the course points. **Students are expected to comply with all laboratory guidelines, protocols, and procedures. Students who do not comply with these requirements or who behave disorderly or disrespectfully WILL be asked to leave. Leaving your cell phone on, leaving early or arriving late can be VERY distracting, you should avoid it. All electronic devices (laptops, cell-phones, etc.) should be turned off or in silent mode.** If your cell phone rings during class it will be confiscated for the remainder of the class period. Use of smartphones, laptops, tablets or similar personal computers is not allowed unless explicitly requested by the individual student the first day of class and for note taking purposes only. No audio/video recording is allowed with express permission of lecturer.

Students will be grading according to the following:

Student Daily notebooks, and group portals	10% of final grade
Student Products	70% of final grade
Student informal and formal assessments (pre-labs, lab quizzes, surveys, exit tickets, quick writes)	10% of final grade
Final student presentation	10 % of final grade

16. Final EXAM period is used for final group presentation of Dielectric ceramic challenge results. The final Exam period is 30C, Thursday April 30, 2015 from 12:30 PM to 2:30 PM

17. Grading Scale - Grades will not be curved and there is no extra credit.

Grade Earned

percentiles

total

A 93

A- 88

B+ 84

B 80

B- 76

C+ 72

C 68

C- 65

D+ 62

D 59

D- 56

E 50

This statement must be included in every grade scale for undergraduate level 1000-5000 syllabi:

“A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>”

18. Make-up Exam Policy – Make up exams will be provided only with the **prior approval of the instructor in accordance with university policies**. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, and religious holidays. In all cases you will be required to provide written documentation, and

obtain prior instructor approval. You will not be excused from any exam without following the policy above, with no exceptions. Students not in attendance for the scheduled exam will receive a score of zero. To be clear, Make-up exams will only be allowed in exceptional cases, with prior instructor approval, sufficient documentation, and in accordance of university policies. Make-up exams for excused absences as well as exam conflicts must occur within 1 week of the missed exam, and may occur before the missed exam. Unexcused missed lecture class formative assessments may not be made up.

19. Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

20. 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.

21. 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, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

22. 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.