

Course Syllabus
Nancy Ruzycki
EMA 3013C Materials Laboratory 2
Spring 2016

1. Catalog Description (2 credits): General undergraduate materials laboratory.

2. Pre-requisites and Co-requisites:
EMA3080C, EMA3800

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. It provided 2 credits towards engineering sciences.

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 student product 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 135
 - b. Telephone: 352.846.2991
 - c. E-mail address: nruzycki@mse.ufl.edu
 - d. Office hours: Monday 5-6 PM, Thursday 6th period

7. Teaching Assistant: TBA

8. Meeting Times: Monday 5th period AND 134 (Anderson Hall, behind Smathers Library)
MTWR Labs 7-9th period Rhines 115/141

9. Class/laboratory schedule: lecture once a week for one hour, laboratory once a week for three hours.

10. Meeting Location: Lecture – AND 134 Lab – Rhines 115 or 141

11. Materials and Supply Fees: \$220.

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

13. Recommended Reading:

W.D. Callister and D.G. Rethwisch

Materials Science and Engineering: An Introduction, 8th edition or up,

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 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

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

Students are required to comply with laboratory safety rules.

Laboratory	Weeks	Concepts	Skills	Student product
Composites	1-3	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 (3-5 pages, 1000 words) experiment, lab notebook
Failure Analysis	4-6	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 (1 page 500 words), student selected case study presentation, Student case study on failed material(3-5 pages 1000 words), Lab notebook

Electronic Materials lab	7-8	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 experiments (2-3 pages 750 words)
Polymer degradation and kinetics lab	9-11	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	12-16	Electronic properties, ceramics processing and characterization	Sintering, mechanical processing, XRD, Dielectric measurements	Experimental design proposal(2-5 pages 1000 words), weekly update reports, peer grading, Oral presentation of experimental result, group information portal

15. Writing Requirement: Each Topic listed above will have a student product which will be graded as a Student Product. Draft versions are counted as Formative Assessments..

Assignment	Due Date/Revision Due Date
Technical report on fiberglass tube (3-5 pages, 1000 words)	Jan 25/Feb 8, 2016
Case Study analysis (1 page 500 words)	Feb 12/Feb 19, 2016
Student case study on failed material(3-5 pages 1000 words)	Mar 4/Mar 14, 2016
Technical report Electronic Materials lab (2-3 pages 750 words)	March 28/April 4, 2016
Experimental design proposal(2-5 pages 1000 words)	April 11/April 22, 2016

The instructor will evaluate and provide feedback on the student's written assignment in accordance with both the UF writing rubric and the course content rubric for that particular assignment, including, but not limited to, grammar, punctuation, usage of standard written English, clarity, coherence, and organization. Students who do not meet minimum requirements for the written assignment will have 1 week from the return of the assignment to make changes, meet the rubric requirements and hand the assignment back in for regarding. Students will receive some loss of points for the re-grade. All feedback on writing assignments will be provided prior to the last class meeting.

Resources for Writing include:

Recommended Writing Manual: Alley, Michael "The Craft of Scientific Writing", 3rd Edition, Springer ISBN-10 0387947663

University's Writing Studio (www.writing.ufl.edu)

Recommended style manual is: IEEE Editorial Style Manual.

http://www.ieee.org/conferences_events/conferences/publishing/style_references_manual.pdf

All written assignments can be turned in early to receive feedback on the draft version. These dates will appear on the course website and will be approximately 1 week before main assignment due date. All writing assignments will be turned in through the class web portal and will be subjected to anti-plagiarism detection. Students found to have plagiarized will be subject to university policies.

Below is the UF writing rubric which will be used to judge mechanics and flow of the written student product. Each student product will also carry a content based rubric. The student products carry two grades, one for the writing mechanics, and one for the content mechanics. Students must satisfactorily meet both rubrics for a passing assignment.

	SATISFACTORY (Y)	UNSATISFACTORY (N)
CONTENT	Papers exhibit at least some evidence of ideas that respond to the topic with complexity, critically evaluating and synthesizing sources, and provide at least an adequate discussion with basic understanding of sources.	Papers either include a central idea(s) that is unclear or off-topic or provide only minimal or inadequate discussion of ideas. Papers may also lack sufficient or appropriate sources.
ORGANIZATION AND COHERENCE	Documents and paragraphs exhibit at least some identifiable structure for topics, including a clear thesis statement but may require readers to work to follow progression of ideas.	Documents and paragraphs lack clearly identifiable organization, may lack any coherent sense of logic in associating and organizing ideas, and may also lack transitions and coherence to guide the reader.
ARGUMENT AND SUPPORT	Documents use persuasive and confident presentation of ideas, strongly supported with evidence. At the weak end of the Satisfactory range, documents may provide only generalized discussion of ideas or may provide adequate discussion but rely on weak support for arguments.	Documents make only weak generalizations, providing little or no support, as in summaries or narratives that fail to provide critical analysis.
STYLE	Documents use a writing style with word choice appropriate to the context, genre, and discipline. Sentences should display complexity and logical sentence structure. At a minimum, documents will display a less precise use of vocabulary and an uneven use of sentence structure or a writing style that occasionally veers away from word choice or tone appropriate to the context, genre, and discipline.	Documents rely on word usage that is inappropriate for the context, genre, or discipline. Sentences may be overly long or short with awkward construction. Documents may also use words incorrectly.

MECHANICS	Papers will feature correct or error-free presentation of ideas. At the weak end of the Satisfactory range, papers may contain some spelling, punctuation, or grammatical errors that remain unobtrusive so they do not muddy the paper's argument or points.	Papers contain so many mechanical or grammatical errors that they impede the reader's understanding or severely undermine the writer's credibility.
------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------

16. Attendance and Expectations - Attendance is **strongly** suggested since significant amount of participation, as well as individual and collaborative work will be performed during the class sessions and will be worth as much as 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.** 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 without express permission of lecturer.

16. The Final The final Exam period is 29A. 7:30 a.m. - 9:30 a.m.

17. Grading: Students will be graded according to the following:

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

18. 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

"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>

19. Make-up Exam Policy – Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

20. 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.

21. 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.

22. 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.

23. 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 higher standard.

24. Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online 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>.