

EMA3013C Junior Materials Laboratory 2
Standardized Syllabus for the College of Engineering

1. Catalog Description (2 credits) – First part of the general undergraduate materials laboratory.
2. Pre-requisites and Co-requisites: Prereq: EMA 3010, EMA 3800
3. Course Objectives - To present the fundamental concepts in materials science and engineering through hands on activities. To experimentally establish the structure, properties, and applications of metallic, ceramic, polymeric and composite materials. To generalize structure-property-performance interrelationships in materials.
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. Apply knowledge of mathematics, science and engineering principles to materials science and engineering.
 2. Design and conduct materials science and engineering experiments and analyze and interpret the data.
 3. Design a materials science and engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.
 4. Communicate technical data and design information effectively in speech and in writing to other materials engineers.

This course addresses the following ABET criteria

- (b1) an ability to design and conduct experiments, as well as to analyze and interpret data
- (b2) an 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.
- (d) an ability to function on multidisciplinary teams
- (g) an ability to communicate effectively (oral)

6. Instructor: Dr. Nancy Ruzycski
7. Office location: RHN 135
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9. E-mail address: nruzycki@mse.ufl.edu
10. Office hours: Monday 5 PM, or by appointment
11. Teaching Assistants: TBD
12. Class meeting times – Monday 6th period WEIM 1084, M,, T, W, F Rhines B06 or Rhines 115
13. Class/laboratory schedule: lecture once a week for one hour, laboratory once a week for three hours.
14. Materials and Supply Fees: \$220.

15. Textbooks and Software Required: none required, recommended MATLAB, CrystalMaker
16. Recommended Reading: W.D. Callister and D.G. Rethwisch Materials Science and Engineering: An Introduction, 8th edition, ISBN: 0470556730
17. Course Outline - Below is the tentative schedule of topics, activities, reading assignments, exams, and homework. See Canvas 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.

Students are expected to dress properly for laboratory class. Closed toed shoes are required for class. Pants are preferred. There is no food or drink of any kind in the laboratory. See laboratory safety guidelines for more information.

Laboratory	Weeks	Concepts	Skills	Student product
Electronic Materials lab	1-2	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 experiments (2-3 pages 750-1000 words) LED Design proposal (500 – 750)
Composites	3-5	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 layup and Mechanical properties (3-5 pages, 1000 words) experiment, lab notebook
Failure Analysis	6-8	brittle/ductile fracture, properties of brittle materials, Fractography, indentation fracture toughness, ductile- brittle transition,	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

		crazing, stress-strain diagrams, Weibull Statistics		material(3-5 pages 1000 words), Lab notebook
Polymer degradation and kinetics lab – Additive manufacturing	9-10	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	11-14	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

18. **Writing Requirement.** Each Topic listed above 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.

The writing assignments/student products for this course are designed to meet the minimum requirements of the University Writing Requirement credit of **4,000 words**. To satisfy this requirement, every assignment's word count must be fulfilled (see Table below).

Assignment	Draft Due Date	Draft Revision Due Date	Final Due Date
Technical Memo on LED experiment (750-1000 words)	Jan 22, 2018	Jan 29, 2018	Feb 5, 2018

LED Design paper (500 – 750 words)	Jan 22, 2018	Jan 29, 2018	Feb 5, 2018
Technical Report on fiberglass Layup & Mechanical Properties (3-5 pages, 1000 words)	Feb 9, 2018	Feb 14, 2018	Feb 19, 2018
Case Study analysis (1 page 500 words)	Feb 12, 2018		Feb 16, 2018
Student case study on failed material(3-5 pages 1000 words)	Mar 2, 2018	Mar 12, 2018	Mar 19, 2018
Experimental design proposal(2-5 pages 1000 words)	Mar 30, 2018	Apr 4, 2018	Apr 6, 2018

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 (Links to an external site.)Links to an external site.)

Recommended style manual is: IEEE Editorial Style Manual.

http://www.ieee.org/conferences_events/conferences/publishing/style_references_manual.pdf (Links to an external site.)Links to an external site.

All written assignments must 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	Documents rely on word usage that is inappropriate for the context, genre, or discipline. Sentences may be overly long or short with awkward

display a less precise use of vocabulary construction. Documents may and an uneven use of sentence also use words incorrectly. structure or a writing style that occasionally veers away from word choice or tone appropriate to the context, genre, and discipline.

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.

19. 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.** If your cellphone 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 without express permission of lecturer.

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

Student Daily notebooks	15%
Student Products	60%
Student Skill Criteria	15%
Final student presentation/project	10%

21. Grading Scale - Grades will not be curved.

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> (Links to an external site.)Links to an external site.

22. 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> (Links to an external site.)Links to an external site.
23. 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.
24. 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.
25. 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.
26. 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.
27. 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> (Links to an external site.)Links to an external site.. 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> (Links to an external site.)Links to an external site..
28. Diversity and Inclusion: This course supports diversity and inclusion for all students. Effective engineering practice relies on the ability to recognize and embrace diversity in all its forms, including viewpoints.