

EMA3080C Fall 2014

Standardized Syllabus for the College of Engineering

1. Catalog Description (3) – 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.

Professional Component	# of credits
Math and science.	
Engineering.	2
General education.	
Other.	
Does it contain design (Y or N)?	

5. Relationship of course to program outcomes

Outcome	Assessed?	Assessment Method
a: Apply knowledge of math, science, and engineering.	Y	
b1: Conduct experiments, analyze and interpret data.	Y	
b2: Conduct statistical analysis.	Y	
c: Solve materials selection and design problems.		
d: Function on teams.	Y	
e: Identify, formulate, and solve engineering problems.	Y	
f: Understand professional and ethical responsibility.		
g: Communicate effectively.	Y	
h1: Understand economic impact.		
h2: Understand global, societal, and environmental impact.		
i: Engage in lifelong learning.	Y	
j: Knowledge of contemporary issues.	Y	
k: Use techniques, skills, and tools of MSE.	Y	

6. Instructor – Dr. Nancy Ruzycki

a. Office location – 150 Rhines Hall

b. Telephone – (352) 846-2991

c. E-mail address – nruzycki@mse.ufl.edu

d. Class Web site (see Sakai)

e. Office hours – Mondays 4-5th periods, Wednesdays 3-4th period, (or by appointment)

7. Teaching Assistant –

Mullenix, Lindsay (mullenix.13)

Kennon, Ethan (elkennon)

c. E-mail address – Mullenix.13@ufl.edu, elkennon@ufl.edu

d. Office hours –

8. Meeting Times – Monday –Thursday 7-9th periods, Monday 5th Period

9. Class/laboratory schedule – Class meets in lab one period weekly for three hours, and a lecture on Mondays for 1 hour.

10. Meeting Location – Rhines 115, Rhines 141 (Class starts in Rhines 115)

11. Material and Supply Fees – See ISIS

12. Textbooks and Software Recommended

a. Title – Fundamentals of Materials Science and Engineering: An Integrated Approach

b. Author – William D. Callister

c. Publication date and edition – 2011, 4th Edition (or 3rd Edition)

d. ISBN number - 978-1118061602

e. This course will use Sakai extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework and exam solutions, announcements, grades, etc.) via the Sakai entry link: <https://lss.at.ufl.edu/>.

13. Recommended Reading (see 12 above)

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.

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 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.

Lab lessons for Fall 2014

Lesson number	Lab(s)	Content/concepts	Skills/techniques	Student product
1 Materials Selection (metals, ceramics, polymers)	Material selection and SOLIDWORKS (1 week)	Change pitch and thread count in order to improve performance on a ceramic, metal and polymer screw. Design process, materials selection	Solidworks, design, materials selection	Solidworks portfolio entry
2 Structure and properties - Heat, transformations and phase diagrams (metals, ceramics)	<ul style="list-style-type: none"> • Labview programming • ASTM calibration of thermocouples • P hase diagram from phase transformation lab • P hase diagram from Free Energy – MATLAB program (three to four weeks)	Work, heat energy and internal energy Standard enthalpy changes, Dispersal of Energy, entropy, Third Law, Gibbs and Helmholtz energies Standard molar Gibbs free energies, Combined 1st and 2nd Laws, Properties of Gibbs Free energy, Phase diagrams, phase boundaries, phase rule, Phase boundaries, partial molar quantities, thermodynamics of mixing, kinetics of phase transformations, chemical	ASTM standards, temperature measurement, Phase diagram construction, MATLAB programming, error analysis	IEEE Report

		Potentials, phase diagrams		
3 Structure and properties – Kinetics, processing and behavior of polymers (polymers)	<ul style="list-style-type: none"> • P olymer synthesis • P olymer MW and crystallization kinetics • P o lymer characterization using DSC • D etermination of an unknown polymer (three to four weeks)	Polymer structure, molecular configuration, polymer properties, polymer glass transition temperature, polymer crystallinity, molecular weight and property relationship, melting, phase changes in polymers, solidification, recrystallization, birefringence, thermosets, thermoplastics, enthalpy, heat capacity	Polarized light microscope, DSC, synthesis, error analysis	Technical memo SOP
4 Structure, processing and properties – relationship of temperature (metals)	Relationship of temperature to grain growth for brass and copper (three to four weeks)	Grain growth, grain size determination, hardness testing, solid solutions, alloys, microstructure in eutectic alloys, nucleation, grain growth, solution heat treating, strain hardening, recrystallization, recovery, cold working	Light microscope, AFM, SEM, grain size measurement, hardness testing, error analysis	Student professional poster
5 Structure, processing and properties of composite materials (ceramic, polymers)	Fiber reinforced composites - role of fiber and matrix in composite materials (two to three weeks)	Principal of combined action, matrix phase, dispersed phase, fiber reinforced composites, influence of fiber orientation and concentration, continuous and aligned fibers, discontinuous and aligned fibers, elastic behavior, polymer- matrix composites, , design elements	Mechanical testing, composite production, curing, design of a tubular composite shaft, error analysis	Student design project

Students will be graded according to the following:

Student daily notebook	20% of final grade
Student products	60% of final grade
Student informal and formal assessments (pre-labs, in class quizzes, surveys, exit tickets, quick writes, etc...)	20% of final grade

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

Grade	Earned percentiles total
A	92
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.

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.