

Standardized Syllabus for the College of Engineering University of Florida

Nancy Ruzycki

EMA3010 Introduction to Materials Science and Engineering Summer 2019 Section 9552

1. Catalog Description (3) – Conceptual perspective for origin of materials behavior and the interrelationships of structure/property/performance. Materials selection and use of familiar material - metals, ceramics, polymers, electronic materials and composites - in electronics and structural and other engineering applications.
2. Pre-requisites and Co-requisites: Prereq: CHM2045
3. Course Objectives - To present the fundamental concepts in materials science and engineering. To describe 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. 3General 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. (Formative, Summative)
- c: Solve materials selection and design problems. (Formative, Summative)
- d: Function on teams. (Formative)
- e: Identify, formulate, and solve engineering problems. (Formative, Summative)
- f: Understand professional and ethical responsibility. (Formative, Summative)
- g: Communicate effectively. (written and oral) (Formative, Summative)
- h1: Understand economic impact. (Formative, Summative)
- h2: Understand global, societal, and environmental impact. (Formative, Summative)
- i: Engage in lifelong learning.
- j: Knowledge of contemporary issues. (Formative, Summative)
- k: Use techniques, skills, and tools of MSE. (Formative, Summative)

6. Instructor – Dr. Nancy Ruzycki

Office location – 170 Rhines Hall

Telephone – (352) 846-2991

E-mail address – nruzycki@mse.ufl.edu

Class Web site - <http://lss.at.ufl.edu> (E-Learning in Canvas)

Office hours – Tuesday 11AM- 12PM, Thursday 2:30 PM-3:30 PM or by appointment

7. Teaching Assistant – TBD

Office location –

Telephone –

E-mail address –

Office hours –TBD

8. Meeting Times – Tues 4th/5th (12:30 – 3:15 PM), Thursday 4th (12:30 – 1:

9. Class/laboratory schedule – Class meets three periods weekly; for 75 minutes, twice on Tuesday and once on Thursday,

10. Meeting Location – Room: [MCCC 0100](#)

<https://at.ufl.edu/service-teams/classrooms/pictures-and-information/mccc---mccarty-0100/>

11. Material and Supply Fees – None

12. Textbooks and Software Required. You will be asked to bring/have a text available for in class work.
13. Title – Fundamentals of Materials Science and Engineering: An Integrated Approach
14. Author – William D. Callister, David Rethwisch
15. Publication date and edition – 2016, 5th Edition
16. ISBN number - 978-1-119-17548-3
17. This course will use Canvas 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 Canvas entry link: <https://lss.at.ufl.edu/>. **You will need Wiley plus to do your homework. See the announcement on how to access Wiley plus [UF All Access Instructions \(Summer 2018\).pdf](#)**

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 schedule is subject to change based on class topic coverage speed

Unit 1 - Structure and Bonding

This unit covers atomic structure to bonding (including some basic organic), Structures of metals, ceramics and polymers, defects in materials and electronic properties. Builds support for core chemistry and physics of structure to develop understanding of bond - structure-property relationships. For crystallography - think basic points, directions, planes in simple systems (FCC, BCC, SC), simple planar density and linear density. More in depth on the simple systems and applications. For electronics understanding conduction, electron mobility related to bond type, intrinsic and extrinsic, basic dielectrics.
Callister 5E chapters 1-5 and 12.

Unit 2 - Structure and Phase relationships

This unit covers the basics of phase diagrams (single and binary) for metals, ceramics and polymers (co-block), and introduces the concepts of TTT and CCT for low carbon steel. Emphasis on reading phase diagrams and understanding microstructure. Callister 5E chapters 10-11

Unit 3 - Structure and Mechanical Behavior

This unit covers mechanical properties of polymers, ceramics and metals, deformation and strengthening, and Failure. Callister 5E Chapters 7-9. In chapter 9, basics of failure are covered but not in depth for S-N and failure modes and propagation. Relationship of structure and microstructure to mechanical properties is emphasized.

Week	Topic	Student product(s)/Class Activities
May 14/16	Materials Tetrahedron Materials Selection Process Start Unit 1 (Chapters 2-5, 12) Chapt 2 – Atomic Structure and Bonding, Chapter 3 Structure of crystalline solids	Class 1 – Pre test Unit 1 Homework on chapter 2 -5, 12 in class problem solving, formative assessments
May 21/22	Chapter 3 Structure of crystalline solids, Chapter 4 Polymer structures	Homework on chapter 2 -5, 12 in class problem solving, formative assessments
May28/30	Chapter 5- Defects in Solids Chapter 12 -Electronic Properties	

June 8	Review for Unit 1 (2-4, 12) Assessment on Unit 1	Homework 2-5, 12 due Assessment on Unit 1: chapters 2-5, 12
June 11/13	Start Unit 2 (10, 11) Chapter 10 – Phase Diagrams	Homework on chapters 10-11, in class problem solving, formative assessments
June 18/20	Chapter 11 Phase Transformations	Homework on 10-11, in class activity and formative assessment Homework Due chapter 10-11
June 24-28 - Holiday	Go and have some fun!!	Some fun is due!
July 2 July 4- Holiday	Review chapter 10-11 In class Assessment on 10-11	Assessment Unit 2
July 9/11	Start Unit 3 (Chapter 7-9) Chapter 7 Mechanical Properties	Homework chapt 7-9, in class problem solving, formative assessments
July 16/18	Chapter 8 Deformation and strengthening mechanisms	Homework chapt 7-9, in class problem solving, formative assessments
July 23/25	Chapter 9 Failure	Homework chapt 7-9, in class problem solving, formative assessments Homework Chapter 7-9
July 30 Aug 1	Review Chapter 7-9 Assessment Chapters 7-9 Engineering Design process and materials selection	Assessment Chapt 7-9 Assignment (online) Engineering Design
Aug 6 August 8	Review for optional FE exam	Online Assignment for Engineering Design Optional Final exam (bonus) FE style questions (Aug 8th)

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 much as 20% of the course points. Proper behavior in class is always important and leads to a relaxed and productive educational environment. Thus, **eating, drinking, texting, reading of newspapers, working on homework for this or other courses, or other activities that are not part of the class is discouraged. Students who do not comply with these requirements or who behave disorderly or disrespectfully WILL be asked to leave the classroom. 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 for videotaping lectures 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.

16. Grading – The course grade will be based on a point system with each class related activity receiving points. Your points are binned according to the activity category, and the final grade is a sum of all of the category percentages. I will post your grades in Canvas, but be aware that Canvas scores are a bit iffy for rounding purposes. The categories for your grades are below.

Formative Assessments (exit tickets, in class problem solving, in class pop quizzes, online quizzes, etc..) 20% weight

Summative Assessments (Assessments/exams) 50 % weight

Student Products (take home activities, homework) 30 % weight

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

Formative assessments	20%
Summative Assessments	50%
Student Products	30%

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>.
25. 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.