

EMA 6938 (Section 17G2)
BIOLOGICAL MATERIALS SCIENCE
Syllabus for Spring Semester 2015

- 1. Catalog Description** – A materials science approach to understanding the structure and properties of biological materials, focusing on the biopolymers and inorganic components found in “soft” and “hard” tissues, with emphasis on their self-assembly into hierarchical structures, as well as the resulting unique composite structures of biomineralized matrices. (3 credit hours).
- 2. Pre-requisites** – Not applicable.
- 3. Course Objectives** - This is an introductory course in biological materials science, where the principles of biological assembly can be applied to a range of fields, such as biomimetic processing of composite structures, bioinspired approaches to tissue engineering and regenerative medicine, functional biological materials, etc..
- 4. Contribution of course to meeting the professional component** - This is a 3 credit course. It provides 3 credits towards engineering sciences.
- 5. Relationship of course to program outcomes** - This course addresses the following MSE Program outcomes (note: letters refer to the list of MSE Program Educational outcomes):
 - a. Ability to apply knowledge of mathematics, science, and engineering to materials systems
 - c. Ability to apply and integrate knowledge of structure, properties, processing, and performance to solve materials selection and design problems within realistic constraints.
 - g. Ability to communicate effectively in both oral and written form.
 - k. Ability to use the techniques, skills, and tools needed for practice as a materials engineer
- 6. Instructor:** Laurie B. Gower, Professor of Materials Science & Engineering
 - a. Office Location: 210A Rhines Hall
 - b. Office phone: 846-3336
 - c. E-mail: lgowe@mse.ufl.edu
 - d. Class Website: <https://lss.at.ufl.edu/> (Sakai login with student ID)
 - e. Office Hours for Gower: TBD
- 7. Teaching Assistant:** Not applicable
- 8. Class Meeting Times:** MWF: 3rd (9:35- 10:25am)
- 9. Class schedule:** MWF 3rd period
- 10. Class Meeting Location:** MAE-B: room 238

11. Material and Supply Fees: NA

12. Textbook required:

- a. Title: Biological Materials Science
- b. Authors: Marc André Meyers & Po-Yu Chen
- c. Publication Date and edition: 2014, 1st edition (Cambridge University Press)
- d. ISBN: 9781107010451

13. Recommended reading: Some handouts and articles will be provided

14. Course Outline: Organic to Inorganic Biological Materials

Topics to be covered:

- Biopolymers:
- Proteins- hierarchical structure and assembly
- Polysaccharides, glycoproteins, proteoglycans- scaffolds for directing cells
- Polynucleotides- molecular recognition as a platform for assembly for advanced materials
- Phospholipids- membranes and assembled mesophases
- Bioinorganics:
- Crystal structure, morphology and defects
- Classical theories on crystal nucleation and growth
- Non-classical crystallization, precursor phases and mesocrystals
- Specific Biomineral Systems (Tentative- depending on topic selection by students)
- Biominerals: invertebrates (calcium carbonate in shells and exoskeletons)
- Biominerals: vertebrates (calcium phosphate in bones and teeth)
- Biominerals: pathological (stones, plaque)
- Biominerals: other (magnetite, silica, etc.)
- Biomimetics and Bioinspired Materials: student choices of topics and presentations

15. Attendance and Expectations:

- **Homework:** Homework should be turned in at the beginning of class. No late submissions will be accepted in order that solutions can be posted after class.
- **Grade changes:** Requests for adjustment to any grade should occur within the 2 week period following the posted grade in question, and must be approved by the course instructor (you can discuss your concerns with the TA, but the TA cannot change grades without final approval from the instructor).

- **Policy on Class Attendance:** Although roll will not be taken, this is a discussion based class, with a percentage of the grade based on participation..
- **Policy on Cell Phones:** Cell phones should be turned off or on vibrate mode during class, with the exception of a primary care giver. If/when receiving a call, promptly move to outside the classroom.
- **Make-up Exam Policy-** Make-up exams will be provided only with the *prior approval of the instructor or excused absence*. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, religious holidays and participation in official university activities such as music performances, athletic competition or debate.

16. Grading:	Exam(s)-	25%
	Oral presentation-	25%
	Final Report-	25%
	Discussion Participation	25%

*An exam will cover the background information provided by the instructor at the beginning, while the oral presentation and written report will be provided by each student, who will teach a topic of interest to the class. The topic can be selected from a chapter of the text, or from related literature of interest, as long as the topic is approved by the instructor.

17. Grading Scale: Final grades will be assigned according to the following scale:

A = 92 - 100	C = 70 – 73.99
A- = 89 – 91.99	C- = 66 – 69.99
B+ = 86 – 88.99	D+ = 63 – 65.99
B = 82 – 85.99	D = 60 – 62.99
B- = 78 - 81.99	D- = 56 – 59.99
C+ = 74 – 77.99	E = below 56

“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. Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

19. Honesty Policy – UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures. See <http://www.dso.ufl.edu/sccr/procedures/honorcode.php>

- 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, <http://www.counseling.ufl.edu/cwc/Default.aspx>, counseling services and mental health services.
 - Career Resource Center, Reitz Union, 392-1601, career and job search services.
- 22. University Police Department** 392-1111
- 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 highest standards of honesty and integrity.
- 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/results>.