

Spring 2016 Syllabus: EMA 6938
Polymers in Drug Delivery

1. **Course Description:** (3 credit hours) – Polymers have played a critical role in the design and application of drug delivery systems that can increase efficacy and reduce toxicity of therapeutics. This course will provide students with an understanding of the principles, strategies, and materials used in the engineering of controlled drug delivery systems. To this end, it will focus on topics at the interface between engineering and medicine such as polymer chemistry, biomaterials, mass transport, and pharmacokinetics. The course will first cover the fundamentals of drug delivery, including physiology, pharmacokinetics/pharmacodynamics, drug diffusion and permeation, and biomaterials used in drug delivery. Controlled release strategies for various administration routes will then be discussed. The course will conclude with special topics lectures from graduate students
2. **Pre-requisites and Co-requisites:** None
3. **Course Objectives:** The objective of this course is to provide students with a knowledge base in the most recent advances in drug delivery and introduce students to topics in biomaterial drug delivery platforms and their corresponding pharmacological mechanisms at the molecular, cell, tissue level.
4. **Contribution of course to meeting the professional component:**
This course provides 3 credits towards Engineering. This course addresses the following MSE Program outcomes:
 - Ability to apply knowledge of mathematics, science, and engineering to materials systems.
 - Ability to identify, formulate, and solve engineering problems.
 - Ability to communicate effectively in both oral and written form.
5. **Instructor:** Dr. Antonio Webb
 - Office location: Rhines Hall 216A
 - Telephone: 352-392-6551
 - E-mail address: awebb@mse.ufl.edu
 - Class Web site: The course website can be found on the Canvas system at elearning.ufl.edu. There you can find the course syllabus, lecture notes, grades, and announcements. Check it frequently.
6. **Teaching Assistant:** None
7. **Office hours:** Thursday 2-3pm or by appointment
8. **Meeting Times:** Mon, Wed, Fri Period 7 (1:55-2:45)
9. **Meeting Location:** Mechanical and Aerospace Engineering Building B, Room 238 (MAEB 238)
10. **Material and Supply Fees:** \$0
11. **Textbooks:** There are no required textbooks for this course. The books listed below are optional.

Title:	Engineering Polymer Systems for Improved Drug Delivery
Author:	Rebecca Bader and David Putnam
Publisher:	Wiley, ISBN: 9781118098479

Title: Biochemical Pharmacology
Author: Palmer, Chan, Dieckmann, and Honek
Publisher: Wiley, ISBN: 9780470174456

Title: Advanced Drug Delivery
Author: Mitra, Lee, and Cheng
Publisher: Wiley, ISBN: 9781118022665

12. **Attendance and Expectations:** Lecture attendance is highly recommended. While attendance is not mandatory, experience has shown that those who attend lectures earn higher grades in the course. Arrival on time is expected. Please turn off all cell phones upon entering class. Reading of newspapers, work on assignments for this or other classes, or other activities that are not part of the class are not allowed during lecture. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom.

13. **Make-up exams/quizzes:** Make up exams will be provided only with the **approval of the instructor in accordance with university policies.**

(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) In general, acceptable reasons for excused absence from an exam 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 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. 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.

14. **Homework Exercises:** Homework exercises will be assigned. These homework questions are essential to your study and some quiz questions will be adapted from them. **No late homework assignments will be accepted.**

15. **Quizzes:** You will be given short quizzes throughout the semester. Make up quizzes will be provided only with the **approval of the instructor in accordance with university policies.**

16. **Grading:** 25%: Student Lectures
10%: Homework and Quizzes
25%: Review Paper
15%: Class participation
25%: Research Proposal

17. **Grading Scale:**

Percentage	≥94	≥90	≥87	≥84	≥80	≥77	≥74	≥70	≥67	≥64	≥61	<61
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade Points	4.00	3.67	3.33	3.00	2.67	2.33	2.00	1.67	1.33	1.00	0.67	0.00

18. **Course Outline:** Below is a tentative list of topics that may be covered in this course.

- Fundamentals and challenges of drug delivery
- Barriers to Drug Delivery
- In vitro models in drug discovery and delivery
- Routes of Drug Delivery
- Pharmacokinetics
- Pharmacodynamics

- Diffusion in Biological Systems
- Drug Metabolism
- Polymer Selection
- Polymer Characterization
- Hydrogel drug delivery systems
- Polymer Microparticles/Nanoparticles/Micelles/Vesicles
- Polymer-Drug Conjugates
- Implantable Drug Delivery Systems
- Drug Delivery in Tissue Engineering
- Controlled Release Drug Delivery
- Mucoadhesive Drug Delivery Systems
- Stimuli-Responsive Polymer Delivery Systems
- Affinity Based Drug Delivery
- Drug Targeting
- Prodrugs/Bioconjugation

19. **Honesty Policy:** All students admitted to the University of Florida have signed a statement of academic honesty committing them 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. 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, 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.