

## Biomaterials for Drug Delivery

BME 4931 Section 038B

**Class Periods:** T, Period 7 (1:55-2:45pm), and R, Period 6-7 (12:50-2:45pm),

**Location:** NEB 202

**Academic Term:** Spring 2018

### **Instructor:**

Blanka Sharma

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352-273-9329

Office Hours: TBD

### **Teaching Assistants:**

None

### **Course Description**

This course focuses on the principles of engineering controlled release systems, and integrates topics in polymer chemistry, biomaterials, pharmacokinetics/pharmacodynamics, and mass transport phenomena. 3 Credits.

### **Course Pre-Requisites / Co-Requisites**

None

### **Course Objectives**

1. Apply engineering principles to the design of controlled release and drug delivery systems.
2. Understand the biomaterials used in the engineering of drug delivery systems for various applications.
3. Evaluate and critique current literature on drug delivery technologies.

### **Materials and Supply Fees**

None

### **Professional Component (ABET):**

N/A

### **Relation to Program Outcomes (ABET):**

The table below is an example. Actual outcomes will vary by program. Below is applicable only to MSE.

Outcome	Coverage*
a. Apply knowledge	Medium
b1. Conduct experiments	
b2. Statistical design of experiments	
c. Design	Medium
d. Function on teams	Low
e. Solve problems	High
f. Professional and ethical responsibility	Medium
g. Communicate	Medium
h1. Economic impact	Low
h2. Global, societal, and environmental impact	
i. Lifelong learning	High
j. Contemporary issues	High
k. Techniques, skills, and tools for degree program	High

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

### **Required Textbooks and Software**

Title: Drug Delivery and Targeting: For Pharmacists and Pharmaceutical Scientists.

Authors: Anya M. Hillery, Andrew W. Lloyd, James Swarbrick

Copyright date:2001

Publisher: Taylor and Francis

ISBN: 9780415271981

Course notes are derived primarily from both the required and recommended textbooks listed. Some course notes are derived from published review articles, and will be provided to students accordingly.

### **Recommended Materials**

Title: Engineering Principle of Drug Delivery

Author: Mark Saltzman

Copyright Date: 2001

Publisher: Oxford University Press

ISBN: 0-19-508589-2

### **Course Schedule**

**\* Note this is subject to change at instructor's discretion**

Week 1: (1/9)	Course Overview, Introduction to Controlled Drug Delivery (Hillery Ch. 1-3)
Week 2: (01/16)	Introduction to Controlled Drug Delivery, Pharmacokinetics/Pharmacodynamics (Hillery Ch. 1-3, Saltzman Ch. 7)
Week 3 (1/23)	Diffusion in Biological Systems (Saltzman Ch. 2-4, Hillery Ch. 3)
Week 4 (1/30)	Polymers in Drug Delivery Systems (Saltzman Ch 9-10, Appendix A2. Hillery Ch 4-5) HOMEWORK#1 DUE
Week 5 (2/6)	Bioresponsive polymers for drug delivery
Week 6 (2/13)	Parenteral Drug Delivery Systems (Hillery Ch. 4-5, Saltzman Ch. 9-10) HOMEWORK#2 DUE
Week 7 (2/20)	Oral Drug Delivery (Hillery Ch. 6)
Week 8 (2/27)	Transdermal Drug Delivery (Hillery Ch. 8) MIDTERM EXAM
Week 9 (3/6)	SPRING BREAK
Week 10 (3/13)	Pulmonary Drug Delivery (Hillery Ch. 10)
Week 11 (3/20)	Drug Targeting (Hillery Ch. 5)

Week 12 (3/27)	Gene/Nucleic Acid Delivery (Hillery Ch. 14) HOMEWORK #3 DUE
Week 13 (4/3)	Cells as Drugs and Drug Delivery Systems Student Presentations
Week 14 (4/10)	Student Presentations
Week 15 (4/17)	Student Presentations HOMEWORK #4 DUE
Week 16 (4/24)	Exam Review
5/1	FINAL EXAM (12:30-2:30pm)

***Attendance Policy, Class Expectations, and Make-Up Policy***

Excused absences must be consistent with university policies in the graduate catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

Students are expected to attend course lectures and participate in class discussions. It is expected that there will be no cell phone or electronic device distractions in class. If you are unable to attend class, will be coming late or leaving early, then you are expected to inform the instructor. Students are expected to be in class, prepared to learn, engaged, and overall contributors to the learning environment. Poor attendance will affect your participation grade.

**Unless prior arrangements** have been made with the instructor, students will be deducted 15% per day for late coursework, with deductions occurring at the time associated with the due date. Unless prior arrangements have been made with instructor, missed exams will receive a grade of 0pts.

While students are encouraged to discuss course material and assignments together outside of class, it is expected that all coursework/assignments submitted is the students' own work.

***Evaluation of Grades***

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Homework Sets (4)	25 each	15%
Midterm Exam	100 each	20%
Final Exam	100	40%
Term Project	100	15%
Participation	100	10%
		100%

***Grading Policy***

The following is given as an example only.

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
93.0 - 100	A	4.00
90.0 - 92.9	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67

76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:  
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

***Students Requiring Accommodations***

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

***Course Evaluation***

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. 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/>.

***University 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 (<https://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.

***Software Use***

All faculty, staff, and students 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.

***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:  
<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

## ***Campus Resources:***

### ***Health and Wellness***

#### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

#### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

### ***Academic Resources***

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:** [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.