



Spring 2020

Lecture: 1:15-2:30 PM, Tuesday/Thursday, Perkins 003

3 credits

**Instructor**

Dr. Amber Doiron

Office: Votey 309D

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Office Hours: TBD based on survey

**Required Textbook**

No required textbook. Course materials will consist of notes, research articles, and other readings posted on the course blackboard site.

I will be pulling information from the following texts to make class notes, but none of these are required texts:

1. Biomaterials Science, Third Edition: An Introduction to Materials in Medicine; Buddy D. Ratner et al., 2012.
2. Biomaterials: The Intersection of Biology and Materials Science; Antonios Mikos and J. S. Temenoff; 2008.
3. Nanobiomaterials: Nanostructured Materials for Biomedical Applications; Roger Narayan; 2013.
4. Introduction to Nanoscience and Nanotechnology; Gabor L. Hornyak, H.F. Tibbals, John J. Moore, and Joydeep Dutta; 2013.
5. Medical Nanotechnology and Nanomedicine; Harry Tibbals; 2011.

**Course Overview**

This course will cover the following key topics: classes of materials, the biological response, and material testing, with a focus on the uniqueness of the nano-scale. Specific topics covered include nanoparticles in imaging, toxicity, nano-topography of surfaces, nanodiagnostics and sensors, nano-coatings in orthopedics, and drug delivery. Course goals include developing an understanding of 1. cell-nanomaterial interactions, 2. biomedical applications of nanomaterials, and 3. methods to evaluate nanomaterials.

**Grading**

Undergraduate

Exam 1	200 points
Exam 2	200 points
Final Exam	150 points
Project	350 points
Participation	100 points

Graduate

Exam 1	150 points
Exam 2	150 points
Final Exam	100 points
Project	350 points
Participation	100 points
Written Proposal	150 points

***The number of points you earn directly determines your letter grade; there will be no rounding!***

B+: 870 to 899 points	A: 930 to 1000 points	A-: 900 to 929 points
C+: 770 to 799 points	B: 830 to 869 points	B-: 800 to 829 points
D: 600 to 699 points	C: 730 to 769 points	C-: 700 to 729 points
		F: <600 points

**Late Work Policy**

Late work will not be accepted without a legitimate excuse or illness; written requests for assignment extensions will be considered in extenuating circumstances. Written proof may be required.

**Academic Integrity**

Students are encouraged to work together and to exchange ideas when working on collaborative assignments and projects. However, students must be sure to submit only their own work and to reference that work properly, including all web sources. UVM's policy on academic integrity is clearly defined and can be found at: <http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf>

**General Expectations:**

This course is a 3-credit course, which means that in addition to the scheduled meeting times, students are expected to do approximately 6-8 hours of course-related work outside of class each week during the semester. This includes time spent completing assigned readings, preparing the teaching package, studying for tests, preparing written assignments, and other course-related tasks.

1. Examination dates are final. No make-up exceptions...except for illness or emergency.
2. Please inform Dr. Doiron of your absences.
3. Requests for re-grading should be submitted in writing to Professor Doiron within 2 days from the return of the exam or coursework.
4. I ask that this classroom be a place of mutual respect amongst adults.
  - No disruptive eating in the classroom
  - Refrain from texting, email, inappropriate internet use during class
  - Arrive on time to class and let me know in advance if you cannot attend.

**Project:**

This course is a unique offering that allows you to gain a greater understanding of issues related to nanobiomaterials through teaching. As part of a team of 2-3, you will prepare a teaching package that includes a lesson plan, a lecture/lesson, a self/group-assessment, assignment questions, a review article, and exam questions. More details will become available midway through the course. As part of your teaching package, you will also teach your chosen topic to the class on a pre-determined date. I want you to work on a topic of interest to you, but overlap between groups will be avoided.

**Participation:**

The participation grade will result from your completion of assignments as well as your attendance and focused work in class.

**Written Proposal (Graduate students ONLY)**

Details on the proposal will be given to graduate students later in the semester. You are expected to demonstrate a grasp of the current state of the art of nanobiomaterials and propose a research project with appropriate literature references for your ideas.

NOTE: You may NOT use material in this course that has been/will be used in a separate course unless you get approval from Dr. Doiron and the other instructor well in advance.

**Disability-related Equal Access Accommodations**

In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact SAS, the office of Disability Services on campus. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly encouraged to

meet with their faculty to discuss the accommodations they plan to use in each course. A student's accommodation letter lists those accommodations that will not be implemented until the student meets with their faculty to create a plan. Contact SAS: A170 Living/Learning Center; 802-656-7753; [access@uvm.edu](mailto:access@uvm.edu); [https://www.uvm.edu/academicsuccess/student\\_accessibility\\_services](https://www.uvm.edu/academicsuccess/student_accessibility_services)

**Religious Holidays**

Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time.

**Respectful Environment**

I will strive to make the classroom a place of mutual respect amongst all individuals. Everyone has the right to be addressed by the name and pronouns that correspond to their identity, including non-binary pronouns. Chosen names and pronouns are to be respected at all times in the classroom. Mistakes may happen, but disrespect of any student will not be tolerated.

Week	Lecture Topic	Important Dates
1	1/14: Syllabus, Intro to Biomaterials	
	1/16: Intro to Materials	Interest Email Due
2	1/21: Intro to Surface Properties	
	1/23: Overview of Nanotechnology in Biomedicine	Article Due
3	1/28: Overview of Nanotechnology in Biomedicine	
	1/30: Biological Response: Protein Adsorption/Corona	Article Due
4	2/4: Biological Response: Complement, Cells	
	2/6: Biological Response: Immune System	Article Due
5	2/11: Biological Response: Particle Targeting	
	2/13: Biological Response: Nanotoxicity	
6	2/18: Makeup/Review	
	2/20: Exam 1	<b>EXAM</b>
7	2/25: Testing of Nanomaterials	
	2/27: Nano Surface Topography	Article Due
8	3/3: No Class	
	3/5: Project Intro/ Societal Nano Issues	
Break	3/9-3/13 No Class	
9	3/17: Gold and Silver Nanoparticles	
	3/19: Project Prep	
10	3/24: Polymeric and Lipid Particles	
	3/26: How to Teach	<b>Project Proposal Due</b>
11	3/31: Carbon-based Nanomaterials	
	4/2: Inorganic Nanomaterials	
12	4/7: Makeup/Review	
	4/9: Exam 2	<b>EXAM</b>
13	4/14: Project Prep	
	4/16: Project Prep	
14	4/21: Groups 1 and 2 Teach	
	4/23: Groups 3 and 4 Teach	
15	4/28: Groups 5 and 6 Teach	
	4/30: Groups 7 and 8 Teach	<b>Review Paper Due/Grad Paper Due</b>
TBD	<b>Final Exam</b>	<b>EXAM</b>

Amber Doiron 1/2/20 5:37 PM

**Comment:** Intro video, short, surveys, gradescope

Amber Doiron 1/2/20 6:59 PM

**Comment:** Make more about uses and applications