

SPRING 2018
Biological Applications of Nanomaterials and Nanostructures [14:635:410]

BME 116
Tuesdays & Thursdays 3:20-4:40 PM

Office Hours
By Appointment, CCR 216

Instructor: Dr. Laura Fabris lfabris@soe.rutgers.edu (Tel) 848.445.5606

Description: This course is for senior undergraduate students with a working knowledge of materials and biological systems. The materials or substrates discussed will typically consist of polymers, metals, and semiconductors whereas the biological systems may consist of cells, genes, and proteins. Methods and mechanisms to engineer interfaces on the nano- and micro-scale will be focusing on two avenues: i) preparing substrates with nano- and/or micro-scale features (fabrication or “top-down” approach); and ii) creating nano- and/or micro-scale substrates (synthesis or “bottom-up” approach). The underlying rationale of this course is to provide a sound understanding of the key principles to design materials-based biointerfaces. This course integrates biointerfaces across size scales, from nano- to micro-scales. Each lecture will encompass advantages and limitations of techniques to engineer nano- and micro-features and substrates.

Homework: Each student will be assigned a relevant reading and prepare a 30-minute seminar that he/she will present to the class. The presentation will need to summarize and explain to the class the content of the assigned reading. The student will be graded based on understanding, ability to critically summarize the content of the reading, and to explain it to the audience. Other aspects will be the quality of the slides and the ability to respect time limits.

Midterm: The midterm exam will be composed of multiple-choice and open questions; the students will have to take the exam in class.

Final Exam: The final exam will be a take home assignment. The instructor will assign a problem, which will be the same for the entire class, and the students will need to design hypothetical experiments to solve it. They will then have to submit a written report, similar to a manuscript submission, describing in detail the materials and methods and explaining what information each of the experiments will provide, and how these results will help prove the initial hypothesis. Each report will be scanned with Turnitin to ensure originality.

Grading: Grades will be based on the following:

<i>Graduate students:</i> Midterm	40 pts
Final	30 pts
Homework	30 pts

Text: No textbook is required. Recommended books are the following:

1. Biomedical Nanomaterials (Zhao, Shen Eds.), Wiley
2. Nanoscience and Nanotechnology for Human Health (Muller, Van de Voorde Eds.), Wiley

Additional readings will be taken from current scientific literature and posted online. The instructor will suggest additional books on a case-by-case basis.

Access to secure class website is necessary:

<https://sakai.rutgers.edu>