ADVANCED BIOMATERIALS
ME/BMED/ChBE/MSE 6777, Spring 2024
T/Th 3:30-4:45 PM, CoC 52

Pre-requisites: ME/BMED 4751 or permission from the instructors. Basic knowledge of chemistry, materials science and engineering, & biochemistry/cell biology concepts.

Instructors: Prof. Julia Babensee, julia.babensee@bme.gatech.edu

Teaching Practicum Assistant: Srujana Joshi, sjoshi346@gatech.edu

Objectives:
1. Provide graduate-level foundation on contemporary biomaterial principles.
2. Discuss concepts of surfaces & interfaces in biomaterial function.
3. Introduce biomimetic & rational design approaches to biomaterial engineering.
4. Discuss cellular and molecular aspects of host responses to biomaterials.
5. Develop critical analyses of biomaterials through grant proposal writing & review.

Reference: *Biomaterials Science: An Introduction to Materials in Medicine*, William R. Wagner, Shelly E. Sakiyama-Elbert, Michael J. Yaszemski, 4rd Ed, Academic Press, 2020.

Web Page: Log in to https://canvas.gatech.edu using GTID.

Exams: Two in-class exams (Feb 20, April 18).

Homework: Assigned reading of research articles and/or resource material required PRIOR to class. Assigned homework will serve as basis for class discussions. An IMPACT STATEMENT for each assigned paper must be submitted on the Canvas site by 3PM prior to class.

Impact Statement: For each assigned paper, provide a short paragraph (2-4 sentences) summarizing the main point of the paper and its impact/significance. The impact statements must be submitted via the Assignment Tab in Canvas by 3PM prior to class. For formatting, list SENIOR AUTHOR (in CAPS) followed by the impact statement for each paper.

Class Discussions: Student teams will lead class discussions based on assigned readings. Teams must provide context for reading and critical analysis. Simple presentation of results in papers is not sufficient.

Grant Proposal: Each student is required to submit a NIH-style research proposal to address a significant fundamental or device-related biomaterial problem. The proposal must include (i) objective, hypothesis, and specific aims of the proposed research, (ii) a statement of significance and critical review of relevant literature, and (iii) experimental design and methods outlining proposed experiments, including experimental variables and appropriate controls, expected outcomes, and potential problems and alternative solutions. Students are required to submit a proposal topic (1/2 page) by February 15 for approval. Students are required to submit the specific aims section (1 page) by March 5 for feedback from the instructor. **Final proposals are due on Canvas on April 11.**

Study Section: Students will be assigned to one of two study sections (chaired by instructors) that will review grant proposals based on NIH merit criteria (see webpage). Each student will prepare a written evaluation for 2-3 proposals and submit them to the instructors by the end of the scheduled class period on April 23. Each study section panel will meet to discuss the proposals (final exam slot, April 30). Peer- and instructor-reviewed scores will be factored into final grade.

All students are expected to abide by the Georgia Tech Honor Code.

Grading:

15%	Class participation
40%	Exams (20% each)
5%	Specific aims
30%	Grant proposal
10%	Study section score