

## **BME 4803 – Global Health & Bioengineering Summer 2020 – GT Beijing Summer Program**

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Office Hours: TBD

**Credit:** 3-0-3

**Prerequisite(s):** None

### **Catalog Description:**

This course will provide an introduction to the grand challenges in global health; e.g., combating HIV/AIDS, malaria, tuberculosis, and other disease, reducing child and maternal mortality, and eradicating extreme poverty, hunger and malnutrition. We will explore the role of engineers in addressing these grand challenges. In addition to traditional lectures, students will work in small teams to write and present a scientific grant proposal aimed at addressing a ‘real world’ challenge in global health these resource-limited environments

**Reference Textbooks:** *Biomedical Engineering for Global Health*, Rebecca Richards-Kortum. Cambridge University Press, 2010.

### **Objectives:**

The objective of this course is to provide students with an introduction to the grand challenges in global health and the role of engineers in addressing these challenges.

### **Outcomes:**

**At the end of the course the students should be able to:**

1. Understand the underlying pathology of the major diseases in global health and the challenges in preventing and treating these health issues in the developing world.
2. Gain an introduction to epidemiology and the metrics and uses of health data.
3. Work in teams of 3-4 students to formulate a novel bioengineering strategy to address a major research or technology gap in for a major global health issue, with emphasis on strategies that will be successful for resource-limited environments.
4. Critically evaluate research proposals and research papers.

**Honor Code:** Students are expected to abide by the Honor Code ([www.honor.gatech.edu](http://www.honor.gatech.edu)), whose immediate objective is “to prevent any students from gaining an unfair advantage over other students through academic misconduct”. Any violations will be prosecuted through the Dean of Students.

**Grading:** 15% Mid-term Exam  
15% Final Exam  
50% Grant Proposal (Four Milestones, including written and oral presentations)  
\* Milestone 1 Written & Presentation (5%)  
\* Milestone 2 Written & Presentation (10%)  
\* Milestone 3 Written & Presentation (15%)  
\* Milestone 4 Written (20%)

10% Homework and Grant & Paper Reviews

10% Attendance, Class Participation & Industry visits

**Exams:** Exams are in class and closed book/closed notes.  
**No makeup exams** (except for documented medical or family emergencies).

**Homework:** Assignments are due at the beginning of class. **Late assignments will not be accepted.** You may discuss HW with other students, but you must hand in your own work.

**Attendance:** Class participation is critical to the success of this class. I will take attendance and it will be part of your grade. In addition, class participation contributes to overall grade.

## BMED 4803: GLOBAL HEALTH ENGINEERING GRANT PROPOSAL

Students will work in teams of 3-4 students to explore a key problem in global health and the development and implementation of biotechnology to address this problem. Teams will submit their written proposal in three milestones and present their findings twice during the semester. The final grant proposal should meet the following guidelines:

**Page limits:** Specific Aims = 1 page (cannot exceed 1 page) and Significance (~1.5 pgs), Innovation (~1.5 pgs), and Approach (~3 pgs). Together = 7 pages (1 page for Aims and 6 for the rest), plus the Budget Justification (1 page) and Budget. The budget must not exceed \$275,000 over a two year award period. Single-spaced, Ariel 11-point font, 0.5" margins. (This page illustrates these guidelines.)

### **Milestone 1: Specific Aims, Significance & Innovation Sections and Oral Pitches**

*Read the NIH description of this section on page G-141 in the NIH guidelines provided on Canvas. The Significance section explains the importance of the problem and helps set the stage for what has and is currently being done to address the global health challenge. At the end of this section, the reader should understand the breadth of the problem and the gap in our current understanding or the current best practices. This section should lead the reader to understand why there is a need for the new idea, technology, or research being proposed. The Innovation sections builds from your Significance section. It describes why your idea is novel, inventive, and 'game changing' for the Grand Challenge you are trying to solve. The Specific Aims section is the first page of your grant. After reading the specific aims page, the reader should know: *exactly* what you propose to do, how you propose to do it, why what you propose is important, what is the current gap in knowledge or specific need, and what the impact will be if you successfully complete these aims.*

**Deliverables:** (1.) Written Specific Aims, Significance, and Innovation sections of your grant. This first draft should be five full pages (1 page for Aims, ~2 for Significance, and ~2 for the Innovation), single spaced, Ariel 11 point font, 0.5" margins. **Due July 3.** (2.) Give a 20-minute lecture on your Grand Challenge. End this lecture with a 2-minute "pitch" for your project. **Due July 4<sup>th</sup> and 5<sup>th</sup>.** (3.) Review the **Specific Aims, Significance & Innovation Sections** from all other groups and provide a written review and score. **Due July 9<sup>th</sup>.**

### **Milestone 2: Completed Grant and Present Your Proposal to the Class.**

The final section of your grant is the Approach section. The goal of the Approach section is to describe in detail the rationale, detailed experiments, expected outcomes of each experiment, and limitations and alternative strategies of each experiment. After reading this section, the reader should know exactly what experiments you plan to perform, including the number of experiments per group, the analysis performed for each experiment, and your expected outcomes of each experiment. In addition, you will detail the limitations and alternative strategies for each aim or sub-aim. Usually, the Approach section should include some preliminary data. In a real grant submission, preliminary data is data (collected by the team of researchers submitting the grant) that provides convincing evidence that the experimental question being tested or device being designed has a high potential for success. These data should also provide convincing evidence that the team of researchers has the expertise to complete the proposed research. The budget for these grants is typically ~\$250,000 (direct costs) per year over 4-5 years. The budget description should detail how these funds will be used and the budget table should clearly describe the proposed budget.

**Deliverables:** (1.) Complete grant. **Due July 11.** (2.) Give a 15-minute presentation; ~10-12 minutes for the presentation +3-5 minutes reserved for questions. (3.) Review the grants from all other groups and provide a written review and score. **Due July 16.** (4.) We will conduct a mock grant review study section in class on July 16-17. I will call on students to discuss each grant.

### **Milestone 3: Revise and Re-submit Grant and Present Your Final Proposal to the Class.**

Final grant application that includes a detailed 'Introduction' section that responds to the reviewer comments.

**Deliverables:** (1.) Written final submission of your grant. **Due July 25.**