

## **Ph.D. Curriculum**

### **Georgia Tech / Emory Biomedical Engineering (BME) Program**

The specific goals of the curriculum components are (1) to leverage our expertise in teaching methodologies, such as problem-based learning, that are a model to other departments internationally, (2) to facilitate adequate depth of knowledge acquisition in areas critical to each student's thesis research, and (3) to provide advanced graduate courses in the areas of research in which the department faculty excel.

The curriculum will facilitate individual flexibility and depth of study through coursework selected by the student (and thesis advisor) in specific categories as follows:

- BME Integrative Core (two 3-hour courses required)
- Engineering/Bioscience Fundamentals (18 hours minimum)
- BME Advanced Graduate Seminar (one 3–5-hour course required)

Additional course requirements include

- BMED 8130: Bioethics-Values in Science (1)
- BMED 8695/8696/8697: TATTO I/II/III (1+1+1)
- BMED 8010: BME Seminar (4 semesters @ 1 hour / semester)
- 9-hour academic minor (note: it is expected that this requirement will typically be met using courses in the Engineering/Bioscience Fundamentals category)

The resulting total minimum number of required hours is 35. It is anticipated (although not required) that student may take other elective coursework to fulfill the requirements of their individual research projects and/or training grants.

### **Summer Rotations and Student Placement**

*Because students must select classes and their capstone area prior to the beginning of the fall semester, it would be ideal to place them with advisors prior to their matriculation.*

**Optional Summer Rotations:** Students will have the option of doing one or two research rotations during the summer prior to their first year. Students who choose to do such rotations will have ample opportunity to meet with faculty members, etc., in order to facilitate selecting an advisor early.

Students who cannot take advantage of the rotation program will be encouraged to arrive on campus on August 1 in order to have time to meet with faculty and, hopefully, select an advisor in time to make their course selections.

## **BME Integrative Core**

This component will introduce students to the open-ended, problem-solving environment that is central to their success in a Ph.D. program. Each course will be co-taught (ostensibly by an “engineer” and a “bioscientist”), and will focus on a particular topical area. Students will—in the context of that topical area—address fundamental technical issues, critically read and evaluate literature, pose well-developed research questions that can be addressed by either experimental or modeling approaches (or both), and understand the importance and limitations of these approaches. In steady state, it is expected that approximately four such courses will be offered during each academic year. As a group, the four courses will span the research areas of our program and the organizational hierarchy from molecular to organismic. Each student will select two of these courses that fit her/his interests, and typically take these courses in the Fall and Spring semesters of the first year in the program.

## **Engineering/Bioscience Fundamentals**

This component focuses on the learning of fundamental knowledge in engineering, in bioscience, and at the intersection of the two. These courses will be delivered both by the Coulter BME Department and by other engineering and bioscience programs and departments at Georgia Tech and Emory (building on the complementary strengths of the two institutions). Although various teaching methods may be used, it is expected that most of these courses will follow a more traditional lecture-based format. The minimal requirement in this category is 18 semester hours total between engineering and bioscience. Eligibility of courses for this category will be based on proposals by the faculty research groups in the BME Program and on approval by the BME Graduate Committee.

## **BME Advanced Graduate Seminar**

This component will provide students will in-depth study in a research area within the BME Program. Each course will require prerequisite material from the both the Engineering and Bioscience Fundamentals. Each course and its prerequisites will be defined by one of the BME faculty research areas. The courses will not be lecture-based, but instead will focus on the reading and analysis of literature in the research area, building upon the skills learned in the Integrative Core courses. Students will be expected to present papers to the class, and will be required to produce a “product” (e.g. research proposal, in-depth analysis of a set of papers) at the end of the semester. Each student must take one of these courses, and will be encouraged to select that course prior to the start of the first year in order to meet the prerequisite requirements.