Biomedical Engineering Research Track

The Biomedical Engineering Department Research Track is designed for exceptional students to pursue a faculty mentored research experience for 2-4 consecutive semesters at 0.5 or 1.0 cu per semester. The student will receive up to 2 cu that may be applied to BME electives. Credit must be applied in integer increments.

Participating in summer activities that foster accelerated entrance into laboratory work is highly encouraged. Such activities include participating in MUSE with the principal investigator (PI), participating in an REU at another institution, or other activity approved by the PI.

Eligibility

1. Sophomore standing or above
2. A minimum 3.3 cumulative GPA at the time of application
3. If applying as a sophomore, successful completion of BME 251 and BME 222 (both taken in the fall of the sophomore year) with a B or better

Requirements

1. Commit a minimum of 12 hours per week in semesters at 1 cu OR commit 6 hours per week in semesters receiving 0.5 cu
2. Apply to PI approved summer research activity
3. Submit a full proposal by the 8th week of the first fall semester in the program
4. At the end of the final semester of the program, the student will submit a portfolio that includes:
    a. Research thesis in the form of a journal manuscript
    b. Each semester's work plan and progress report
    c. A report delineating dissemination activities (MUSE/REU poster, conference posters or presentations), outcomes achieved, statement of importance of the research track to career goals and current career plans

Application Process:

Before beginning the application process, students must meet with prospective PIs to discuss project ideas and consider summer research activities.

Applications are submitted on the first Wednesday of March in the spring semester. Proposals submitted at other times may be accepted based on extenuating circumstances.

I. Cover page that includes:
   Project title
   Student name
   Adviser name (with signature)
   Indicate if the application is for 1 year (1 cu per semester) or 2 years (0.5 cu per semester)
   Statement on the use of human or animal subjects. Approval must be obtained prior to enrollment in the first research course (typically the enrollment period for the fall of the junior year)
II. Project Description (1/1/2 to 2 pages):
   a. Background
   b. Significance
   c. Objectives
   d. References
III. Facilities and equipment needed to complete the research (1/2 page maximum)
IV. Expected safety training required to complete the research (1/2 page maximum)
V. Curriculum plan for junior and senior year
VI. Agreement to apply to PI approved summer research activity and to participate if the application is awarded.
VII. Inc Include information on the PI approved summer research activity. (Provide the MUSE application if applied to).

Deliverables by students in research track:
After admission to the research track, students are expected to deliver the following documents:

I. Detailed project proposal (5 pages, double spaced, 1-inch margins)
   Due either 1) the end of the summer program if the student participates as a rising junior; or 2) by the 8th week of the first fall semester in the program if a summer award is not conducted for the first summer.

   a. Specific Aims (1 page)
      i. State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

ii. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, address a critical barrier to progress in the field, or develop new technology. The engineering concepts and approaches must be clearly delineated.

b. Research Strategy

i. Significance

1. Explain the importance of the problem that the proposed project addresses.
2. Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
3. Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

ii. Innovation

1. Explain how the project challenges and seeks to shift current research or clinical practice paradigms.
2. Describe any novel theoretical concepts, approaches or methodologies, instrumentation or interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions.
3. Explain any refinements, improvements, or new applications of theoretical concepts, approaches or methodologies, instrumentation, or interventions.

iii. Approach

1. Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project
2. Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
3. If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work.
4. Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised.
5. Provide a timeline of activities for the duration of participation in the program (2, 3 or 4 semesters). The timeline should be appropriate to the number of cu (0.5 or 1.0) for a given semester.

II. Progress report

Due by the final exam week of the relevant semester.

Summarize the specific aims of the previous project period and the importance of the findings, and emphasize the progress made toward their achievement. Explain any significant changes to the specific aims and any new directions including changes to the specific aims and any new directions. A list of publications, patents, and other printed materials should be included in the Progress Report Publication List attachment; do not include that information here.

a. Results to date
b. Changes to original proposal
c. Specific outcomes achieved such as presentations, papers, abstracts
d. Plan of activities for the upcoming semester
e. Updated timeline

III. Research thesis
Due in week 12 of the final semester.

The details of the content, format, length, etc will depend on the faculty mentor's determination of the appropriate journal for the completed work.

IV. Oral Presentation of thesis
Complete no later than the final week of the final semester