

## **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. Participation for one summer is required, contingent on a successful MUSE faculty-student application. The student will receive 2 cu that are applicable to two of the 4 BME electives.

### ***Eligibility***

1. Sophomore standing
2. A minimum 3.3 cumulative GPA at the time of application
3. 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 12 hours per week in semesters at 1 cu OR commit 6 hours per week in semesters receiving 0.5 cu
2. Apply for MUSE as a rising junior and participate if awarded
3. Submit a full proposal either: 1) the end of the MUSE program if the student participates as a rising junior; or 2) by the 8<sup>th</sup> week of the first fall semester in the program if a MUSE award is not received for the first summer.
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 poster, conference posters or presentations), outcomes achieved, statement of importance of the research track to career goals and current career plans

***Application Process:***

Applications are submitted on the first Wednesday of March in the spring semester of the sophomore year. Please note a MUSE application is required within the Research Track application. MUSE applications are typically due February 1s

- I. Cover page that includes:
  - Project title
  - Student name
  - Adviser name (with signature)
  - State 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 needs (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 MUSE as a rising junior and participate if the application is awarded.
- VII. Include the Student MUSE application

**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 MUSE 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 MUSE award is not received 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 mentors 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