Stanford Bioengineering Bootcamp

"This program was a life-changing experience. I am convinced that the BioE bootcamp should have had an extra day or so in the week or extra hours because I would have rather had more time to experiment and explore."

"This was one of the best summers I've had yet"

"Overall, I really enjoyed working with my team. I was surprised at how well our team worked together, and I'm grateful to have worked with them for this project."

-Summer '23 Student Feedback

Program Description

The SIMR Bioengineering Team Internship is a **hands-on design experience** in bioengineering for high school students. Students attend lectures on a diverse set of **bioengineering research topics through lectures and work for 3 days a week (Wed/Thurs/Fri; 9-4 pm)** on a real-world biodesign project which addresses a medical need. The tentative dates for the bioengineering internship are **June 10- August 1, 2024**. Students in teams of 4-5 will practice their own engineering and critical thinking skills when they develop solutions, evaluate technical pros/cons, build prototypes, and test certain aspects of their creations. A teaching team of undergraduate and graduate students teaches the design process, recruits lecture speakers, provides mentorship, and holds design reviews for the students. At the conclusion of the program, student teams will present their prototypes at the SIMR poster session at the end of the program.

Bioengineering (BioE) Bootcamp is an intensive interactive eight-week program designed with two major objectives:

1. **To expose high school students coming from a broad range of experiences, interests and backgrounds to the enticing field of bioengineering.**
2. **To provide students with hands-on engineering experience in the process of Biodesign.**

Students work together in teams under guidance of a team of Stanford graduate students on identifying important medical needs and engineering practical solutions for these needs.

By the end of this BioE 8-week internship, each team will have developed an innovative prototype that targets a specific medical need area. To meet this objective, each team will have access to Stanford's plethora of resources including an advanced machine shop, cutting-edge

maker spaces, wet laboratories, and a handful of specialized bioengineering Stanford faculty and students. For example, in previous years, teams have engineered a novel eye-drop delivery system, light-based diagnostic tool for cancer, and a specialized football helmet that predicts concussions in real-time using machine learning. Some teams will even continue this work long after the end of the SIMR program!

Program Benefits beyond the Prototype

- Exposure to a **broad spectrum of Bioengineering topics** ranging from protein engineering to brain machine interfaces through selected lectures given by professors.
- Learn and practice the Biodesign process with **hands-on workshops and lectures**.
- Develop and practice soft skills on how to be effective technical communicators across various mediums, including presentations, posters, and technical writing.
- **Stronger understanding of college majors and careers** they might want to pursue after graduation.
- Networking with Stanford faculty, graduate students, and like-minded SIMR students.
- Students develop **strong research skills** including performing user interviews, reviewing scientific journal articles and literature, and patent search.
- Summer stipend, planned social activities, and access to many Stanford resources.
- **Learn new bioengineering skills.** Past students reported SIMR taught them how to use:
    - Microcontrollers like Arduinos
    - Basic circuit design
    - Computer programming and machine learning
    - 3D printing and CAD
    - Polymerase chain reaction (PCR)
    - Casting silicone
    - Much more!

PLEASE NOTE: Students must be current juniors or seniors as of Jan. 2024 and must also be at least 16 years old by the start of the program. There is no fee for participating in the Bioengineering Internship besides the application fee. Students must also attend the orientation on the first day of the program (June 10th, 2024).