

SUMMER SCHOLARS PROJECTS

PROJECT CATEGORY:

Biotech

STARTUP: Stemloop, Inc.

CONTACT:

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PROJECT TITLE:

Build a Biosensor: Discover, Develop & Deploy a Biosensor in 8 Weeks

PROJECT DESCRIPTION

Stemloop—The Biosensor Company—is on a mission to unlock the power of biology to sense and respond to the world’s challenges. We address large unmet chemical testing needs with cell-free biosensor technology developed at Northwestern University’s Center for Synthetic Biology. We discover, develop, and deploy easy-to-use, inexpensive, and rapid biosensors to solve the problems faced by traditional analytical testing in laboratories: high complexity, high cost, and slow turnaround time.

Stemloop biosensors are enabled by dynamic bacterial proteins known as allosteric transcription factors. We discover these protein biosensors using an internal bioinformatics pipeline, we develop them with the tools of synthetic biology in our state-of-the-art molecular biology laboratory, and we deploy them in inexpensive and easy-to-use devices like rapid at-home COVID tests.

For this project, we are looking for an ambitious and talented intern to spend their summer building a biosensor – discovering, developing, and deploying a novel sensor for an analyte of their choosing. Their work will be guided by our technical team, who have previously built dozens of cell-free biosensors. Unique to this project, we expect the intern to “build in public” through content creation – this will involve weekly public sharing of their experience building a biosensor at Stemloop by blogging, posting, and/or tweeting through Stemloop’s accounts. The project is well-structured for an 8-week internship and includes a well-defined and achievable end-goal – a proof-of-concept biosensor.

JOB EXPECTATIONS:

The candidate is expected to be deeply passionate and knowledgeable about using biotechnology to solve global challenges in planetary and/or human health. They are expected to be technically capable, deeply analytical, and have strong communication skills.

In the first week, we expect the intern to onboard with the team and quickly become familiar with the underlying technology through the reading of literature and by taking the initiative to ask the team lots of questions to fill in knowledge gaps. In the second week, we expect the intern to identify—with our guidance—a biosensor that they’d like to build, including a strategy for doing

so. Weeks 3 and 4 will have the intern designing the DNA for the biosensor, cloning into an *E. coli* expression plasmid, and then expressing and purifying the protein. Weeks 5 and 6 will have the intern working semi-independently in the lab to characterize and fine-tune the performance of their biosensor. Finally, Weeks 7 and 8 will have the intern taking their optimized biosensor reaction and demonstrating proof-of-concept, using devices already developed and deployed at Stemloop.

Throughout this process we expect the intern to generate weekly content for social media, written for a scientific lay audience, that summarizes their learnings about the technology, the team, and Stemloop capabilities. Weekly posts will be reviewed and edited by the Stemloop team to ensure appropriate messaging, adherence to brand guidelines, and effective scientific/business communication.

DESIRED EXPERIENCE:

- Degree seeking student enrolled in undergraduate/graduate bioengineering, computational biology, microbiology, biochemistry, bioinformatics, or related life science coursework.
- Prior experience in a life science research lab.
- Strong scientific communication and interpersonal skills to collaborate in a results-oriented, fast-paced environment and to document and report weekly progress.
- Fluency with office productivity software (e.g., Microsoft Office 365) and ability to quickly learn how to use content creation (e.g., Adobe Express) and social media (e.g., LinkedIn) tools.

Preferred Requirements:

- Experience with DNA cloning and other basic molecular biology techniques.
- Familiarity with *E. coli* protein expression and purification.
- Social media maven.

TIME COMMITMENT:

The intern is expected to work full-time during the internship period. Exact hours are flexible with expected participation in team meetings, which are typically scheduled between 10am-4pm.

TRAINING MENTORING:

Throughout the internship the student will work closely with Stemloop's technical team of Scientists and Research Associates. Additionally, the intern will have opportunities to directly interact with Stemloop executives and faculty Cofounders. The student will be given opportunities for informal progress updates and guidance and feedback on formal presentation and writing, focusing on effective scientific communication. The format of these informal and formal sessions are detailed below.

Daily Planning Sessions: Intern will meet daily with their supervisor to discuss project progress, challenges, and plans for the day. Supervisors will assist interns in developing research/development plans to overcome challenges that arise.

Weekly R&D Meetings: Intern will present results, challenges, and next steps in a brief formal presentation consisting of slides and oral presentation during Stemloop's weekly R&D meeting.

Feedback on progress and future direction from Stemloop senior leadership will be given during these meetings.

Final Presentation/Report: Stemloop supervisors and leadership will guide the intern in the development of their final presentation, including a practice session during a dedicated internal Stemloop meeting. Clear descriptions of expectations will be provided, as well as regular feedback on progression during weekly meetings. Guidance on their final report will be provided.