

Uplift: a STEM research scholarship for underprivileged undergraduates at CU

PIs: Edward Chuong (Assistant professor, MCDB), Lee Niswander (Chair, MCDB)

Abstract

Undergraduate research experiences represent pivotal first steps into research careers, but students from underrepresented groups face financial and cultural barriers to accessing these experiences. We are requesting funds to support "Uplift", a research internship for underrepresented students. Uplift scholars are supported by a \$3,000 stipend to conduct a 1.5 semester internship in a host STEM lab at CU. The program includes identity-based mentorship, professional development workshops, and community building. The program prepares students to apply for university-level and national scholarships, and graduate school and/or STEM careers. Host labs come from all STEM departments. The program is run by the STEM Routes graduate student organization and successfully piloted in 2021-2022 with 20 students completing the program, with 17 more in the 2022-2023 program. College support of Uplift would provide crucial funds to maintain the program and improve the success and retention of diverse undergraduates in STEM at CU.

Project Summary

The Uplift program is a new undergraduate scholars program at CU Boulder, developed to improve the retention and success of students from underrepresented groups (URGs) in STEM fields. The Uplift program was conceived by the graduate student organization STEM Routes, which works with the Colorado Diversity Initiative to run the program. The Uplift program provides mentored undergraduate research experiences to 20-25 students a year in host STEM labs, accompanied by weekly career development workshops designed for students from URGs.

Increasing Diversity in STEM at CU Boulder

Promoting the success and retention of students from URGs in STEM is a significant current challenge at CU Boulder, a primarily white institution. URGs constitute 28% of the State of Colorado, but just 14% of Boulder County. At CU Boulder, URGs make up 19% of entering freshmen (16.2% of STEM majors), 9% of graduate students, and less than 5% of STEM faculty. Students from URGs face difficulties finding community in their research environments, and show lower retention rates in STEM majors. CU Boulder faces many challenges related to recruiting and retaining URGs, and one of the major obstacles is the lack of existing community and representation within STEM departments and research groups.

Undergraduate research experiences are a crucial step towards a career in STEM. Many universities including CU Boulder offer scholarships that support research experiences in STEM labs, which are often important prerequisites for graduate school. However, these scholarships are highly competitive and disproportionately inaccessible to URGs. Successful applicants often already have research experience, favoring those who are able to afford unpaid volunteer positions. Students from URGs are also often unaware of how to navigate these opportunities. Several universities have highly successful STEM Scholars programs targeted for diverse students, such as the Meyerhoff Scholars program at the University of Maryland Baltimore County. Prior to Uplift, CU Boulder did not have any undergraduate STEM research scholarship specifically designed for students from URGs.

Goal

The goal of the Uplift program is to improve the success of STEM undergraduates from URGs through a mentored 1.5 semester-long research internship. Key components include a shadowing period, mentorship by graduate students of diverse backgrounds and faculty, and a career development workshop series. The Uplift program aims to substantially increase the number of CU URG undergraduates who successfully obtain research scholarships and/or positions in STEM-

related fields. In addition, the increased presence of diversity-focused initiatives and inclusive mentorship practices in research labs will help improve the cultural climate for diverse students in CU Boulder labs. Finally, the program will help build a strong mentorship-focused community of graduate and undergraduate students across many STEM departments at CU Boulder. Biweekly workshops and events will help build a community of underrepresented students across STEM disciplines at CU Boulder, for students who may struggle to find representation within their own departments.

Program details

Application process: The program is open to all students, but is intended for those from underprivileged or underrepresented backgrounds, including disabilities, socioeconomic disadvantages, or other extraordinary challenges. The application was developed with the Colorado Diversity Initiative to ensure adherence to all federal and state limitations. Applications are de-identified through this office before review by STEM Routes. The application consists of questions that assess ambition, resilience, interest in a STEM career, and students' interest in serving their community. Applicants are also asked to provide race/ethnicity, citizenship, parent level of education, and how the student's education is currently being funded (e.g. Pell Grants). The Uplift program is specifically intended to serve students with a lack of prior research experience due to challenges related to being from an URG. Applications are first screened using this criteria by STEM Routes and then matched to faculty of participating host labs. The program selects a class of 20-25 scholars each year to participate in a paid research internship with participating host STEM labs across campus (e.g., Natural Sciences, Computer Science, Engineering, Math).

Research internship: Each year, labs across CU STEM departments are recruited to volunteer to host an Uplift student for that year. For the research portion of the program, scholars conduct a 6-month structured internship, supported by a \$3,000 stipend. The internship is conducted under the guidance of a lab mentor (e.g., a graduate student or postdoc) and host faculty members who are provided suggestions for adapting their mentorship for students from URGs. The program begins with a 2-month "Shadowing period" as a guided transition into the research environment. The Uplift scholars will shadow a lab-mentor and learn about life in the lab, then present their experience as a 3-minute elevator pitch at an Uplift event. In a subsequent 4-month "Guided research period", interns are expected to conduct their own research under the guidance of their lab-mentors. At the end, scholars will give a short talk on their research to scholars, mentors, and faculty associated with the Uplift program, and summarize their project through a creative medium of their choice (e.g. a poster, a video, or podcast). During the program, all Uplift scholars and mentors attend biweekly workshops focused on mentorship, career development, and issues that are relevant to students from URGs, including financial advice, imposter syndrome, and unwritten rules in academia. Faculty mentors actively participate in multiple workshops, and interact personally with the scholars throughout the program.

Evaluation of outcomes: To ensure the Uplift program is successful, we will continuously assess the outcomes of Uplift alumni. We will track all alumni (scholars and mentors) and conduct yearly surveys to evaluate whether the Uplift program was successful in facilitating the success of underrepresented students in STEM-related fields. We will assess whether the students have received personal fulfillment and a sense of belonging within the STEM community during and after the program. We will track whether Uplift alumni successfully apply for university research scholarships (e.g., Undergraduate Research Opportunities Program, Biological Sciences Initiative, McNair Scholars, NSF Research Experiences for Undergraduates), are accepted to graduate school, or obtain a job in a STEM-related field. We will also seek feedback from students, mentors, and faculty hosts to ensure program effectiveness. Our ultimate goal is to improve the research climate for URGs in STEM labs and increase their success and representation.

Program Development

In 2021, the Uplift program received a 2-year \$150,000 pilot grant from the Packard Foundation, with the PIs being three current Packard fellows in A&S: Edward Chuong (MCDB), Ann-Marie Madigan (APS), Jingchun Li (EBIO). The seed grant provided \$75,000/year for two years to support 20-25 student stipends and workshop expenses each year. In the 2021 pilot year there were 20 scholars (selected from 60 applicants) who successfully completed the Uplift program. In the current 2022 program, there are 17 scholars (80 applicants). The Uplift program has been successful in attracting significant interest and recent scholars have pursued STEM jobs and graduate education. However, the Uplift program currently has no university or college support and will be forced to stop with Packard funding ending in 2023.

Organizations involved

The Uplift program is primarily developed and run by a graduate student organization named STEM Routes, which was formed by graduate students in 2018 and is the designated Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) chapter at CU Boulder. STEM Routes was recently recognized for their efforts by the University of Colorado President's Diversity Award in 2021. They currently work as unpaid volunteers to organize the program.

Uplift graduate student coordinators: Dana Stamo (ChBE), Andrea Ordonez (MCDB), and Stephanie Plaza Torres (GEO)

Colorado Diversity Initiative: Barbara Kraus, Kristin Lopez

Uplift program faculty mentors: Edward Chuong (MCDB), Ann-Marie Madigan (APS), Jingchun Li (EBIO), Lee Niswander (Chair, MCDB), Katherine Ramos (Integrated Design Engineering).

Participating host lab departments (2021 and 2022): Over 10 participating STEM departments including MCDB, BCHM, ChBE, EBIO, APS, CSCI, ICS, GEO, ME, Physics, and others

Project Budget

We are requesting **\$40,000** which would support the Uplift program in 2023-2024. The funds would be used along with lab and department matching funds to support student stipends (\$33,000 for 11 students), and to support the biweekly community events and career development workshops (\$7,000). University support will be crucial for the stability of Uplift and will demonstrate institutional support for CU's underrepresented students in STEM. The funds will allow us to build on the momentum of the Uplift program and secure additional supporting/matching fund agreements from more departments across campus. If the majority of STEM departments and/or labs agreed to sponsor several Uplift students per year, the stipend costs would be efficiently distributed and require less university-level support in the future. The success of the program will also increase our competitiveness for external funding requests from the NIH and NSF supporting CU DEI efforts in STEM.

Additional information

Uplift program: <https://www.colorado.edu/studentgroups/stemroutes/uplift-research-program>
CU Boulder Today (9/8/2022) article about Uplift:

<https://www.colorado.edu/today/2022/09/08/grad-students-organize-stem-research-experiences-underrepresented-undergrads>