

Promoting Community College Opportunities in Undergraduate Research in the Space Sciences

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Abstract

Undergraduate research is an excellent way to engage STEM students and increase retention. With a wide range of student diversity, community colleges are an important part of the STEM pipeline. Historically, it has been difficult for community colleges to provide undergraduate research opportunities due to lack of funding for projects and little support or opportunity for faculty to pursue research. Colorado Space Grant has allowed our students and faculty access to excellent research opportunities at an affordable price. These collaborations have led to active space science projects, including microbial and DNA near space exposure experiments, a design for removal of space junk in orbit and a telescope network for student observing and data access. Another effort to support and encourage student research was the introduction of the STEM Scholars summer research internship project, supporting seven first generation college students. The students were placed with faculty from RRCC, and several of our four year transfer partners. The students present their research posters at an Expo at the end of the semester, giving them professional presentation experience. Being engaged in cutting edge projects and research helps student retention in college and in the space sciences.

Making rocket payload development affordable

Space research involving rocket launches is immensely rewarding for undergraduate students, but costly. To bring this opportunity to our community college students, we developed an interdisciplinary, cross-campus collaboration to launch a rocket payload through the NASA Space Grant RockSat program. The three campuses involved share the launch and materials costs. Each school has a student team, including a team lead and an advisor. The student team designs the

experiment, builds the payload and participates in integration and launch. The first collaborative project tested viability of unprotected DNA, radiation shielding and detection during the flight. This year, our team is developing a system to trap small space debris to protect payloads from micro-scale impacts. This project provides an outstanding opportunity to engage high-achieving undergraduates and leads to successful transfer and completion in engineering and space science degree programs.

Developing a Telescope Network for UG Researchers

A new initiative has grown out of a STEM Scholar summer internship. The need for student access to telescope observing time and data for research projects has been identified. To address this need, RRCC is working on the development of a Colorado Telescope Network. An online platform will help students identify available observatories and existing datasets for introductory research projects. Making astronomical data more available and dark sky location observatories more accessible will increase student interest in astronomy and space science as a career path.

Conclusions

Collaborating with Colorado Space Grant has provided the necessary resources to develop a rigorous and innovative undergraduate research focus at Red Rocks Community College. Affordable access to near-space and low Earth orbit platforms has driven students towards developing experiments, projects and new technologies in the aerospace realm. Such partnerships benefit students directly through scholarships, professional presentation opportunities and involvement in cutting edge projects; all of which help with student retention in STEM.