

## Undergraduate Research and Creative Work in the Common Curriculum

Submitted by the Undergraduate Research Working Group

Lacking a centralized support structure, we write to you as a collective of CU Boulder's largest undergraduate research programs (named below). Our programming receives funding from a range of internal and external sources, supports hundreds of students annually and represents all disciplinary areas. We appreciate the opportunity to share our experience while speaking to the deeply-layered benefits of undergraduate engagement in the academic and creative life of our innovative campus. We support an equitable approach to translating these transformative opportunities into accessible and inclusive experiences and advocate for greater institutional investment. With decades of data and stories confirming the scholarship on high-impact practices, we know that learning in partnership with the research and creative community creates impact at the intersection of scholarship and teaching—and is disproportionately valuable for historically minoritized and underserved students.

Our campus has an expansive history of undergraduate research with significant efforts pre-dating even the Boyer Commission's recommendation to "make research-based learning the standard" in *Reinventing Undergraduate Education* (1998). For example, the Undergraduate Research Opportunities Program (UROP) was created in 1986; the Biological Sciences Initiative (BSI) started in 1989. A significant body of scholarship has emerged since and continues to demonstrate the value of broadening participation and involving students as early as possible. Recent white papers from the Council on Undergraduate Research highlight how engagement prepares students to meet the needs of employers in the rapidly changing future of work. To succeed, students will need critical thinking, problem solving, collaboration and communication—all learning outcomes from undergraduate research. **With well-documented benefits from retention and graduation to resilience and belonging, undergraduate research represents an opportunity to think integratively about a student-centered education that makes the most of CU Boulder's global leadership in research and creative production.**

Connecting students to the campus innovation ecosystem has been the work of our programs for decades, and our experience with a range of models demonstrates the many ways students can benefit from engagement with the research and creative community—from course-based experiences to apprenticeships. A common theme in our programming is the financial support we provide to students and faculty. Funding is critical to ensuring equitable access and should be considered in campus-wide conversations about social justice. The collective resources of our programs represent less than 1% of the university's \$500M in research expenditures in 2020 and support less than 5% of undergraduates annually. These equity gaps will continue to present insurmountable barriers for many students without investment in their untapped potential. The development of a common curriculum presents an opportunity to address systemic and internalized barriers by creating intentional pathways that enable students to see themselves succeeding in unfamiliar contexts.

In addition to the flexibility that funding provides, students who have been historically excluded from the academic conversation should be enabled with the confidence to take risks in the engagement of new ideas and feel their voice is valued. Space must be made for belonging—with vigilance to the insidious nature of imposter syndrome and the external realities reinforcing it. No curricular goal is common if some are excluded. First generation students and other populations new to the cultures of the academy should be empowered with the institutional literacy to author their own narratives of success, understanding how to contextualize failure and balance the often competing demands of academic excellence and personal well-being. Of the many benefits of undergraduate research, confidence in one's own self-efficacy is, perhaps, the most transferable—leading to success in all aspects of life.

Pointing out that “high-impact practices [HIPs] are data-driven teaching and learning practices that have been widely tested and have been shown to be beneficial for college students from many backgrounds”, the campus *IDEA Plan* calls on the university to “grow efforts to increase the accessibility of [HIPs] programming (study abroad, internships, undergraduate research) for all students” (12). The campus *Academic Futures* report recommends that “schools and colleges should make available research experiences and/or internship and community engagement opportunities for undergraduates, and students should be strongly encouraged to take advantage of such offerings” (47). Highlighting the need to integrate experiences throughout the curriculum, the report explains that “efforts should include support and incentives for all parts of campus to design, develop, and scale research and internship experiences for their students” (47).

**We encourage colleagues to prioritize undergraduate research and creative activities in the development of a common curriculum that addresses the systemic barriers to participation from support structures to funding mechanisms.** Our current constellation of programs provide a patchwork of uneven support with increasingly strained resources, which often replicate the inequities they are designed to address. Additional resources would enable our programs to advance diversity goals, but a more comprehensive and holistic approach to undergraduate engagement is needed. **As the committee considers values central to a student-centered education, we see significant opportunity in the vibrant research and creative community central to CU Boulder's identity.** We advocate for centering students in the academic life of the university and enabling them to take full advantage of their experience, integrating their classroom learning with participation in the global community of scholars.

Our actions not only connect students to the academic conversation but help ensure their identities and experiences are reflected in the academic community by providing pathways for historically minoritized students to enter faculty ranks. From matriculation onward, we have a role to play in advancing diversity in higher education. The latest system *Diversity Report* (2020) demonstrates the challenge is significant—and close to home. With 6.5% of total instructional faculty identifying as Black/African-American, American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, and Hispanic/Latino, and only 3.7% of total research faculty identifying from the same groups, BIPOC students on our campus have

few potential mentors who share their backgrounds and experiences. Programs like ours provide a pipeline to the professoriate for underrepresented groups and models for the transformative potential of intentional, culturally responsive programming supported by financial resources. See example student outcomes from undergraduate research below.\*

With continued efforts to diversify our research programs and student participants, we provide essential inquiry-based learning opportunities for historically minoritized students and are well-positioned to contribute to the university's long-term goals of diversity, equity and inclusion. The university's commitment to anti-racism work cornerstones our programming, which shows how actively integrating research into the student experience can leverage funds to diversify outreach while contributing to retention and student success. With experiential learning, we create access and increase career-readiness that helps with the transition to industry after graduation. It is a critical necessity to design and offer inclusive opportunities for students supported by community building, sensibility, and connection to industry through research and competitive modes of learning.

A common curriculum has the potential to empower our students to leverage their learning beyond the classroom in ways that promote social justice and advance the university's mission to provide solutions to local, national and global challenges—not only preparing for but creating the future. It is imperative that the transformative potential of CU Boulder is not limited to those with the privilege to take advantage. To further the public good, we must embrace our mission with a culturally responsive approach that answers calls for equity. Students historically minoritized on our campus should be enabled with the information, resources and encouragement to find belonging in the creation of knowledge and feel that the knowledge they bring is valued in these communities. A CU Boulder education should cultivate curiosity and empower students with inclusive mentorship.

Signed: CU Boulder Undergraduate Research Working Group

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**Undergraduate Research Opportunities Program (UROP)**

**Professional and Academic Conference Endowment (PACE)**

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**Your Own Undergraduate Research Experience at CU (YOU'RE @ CU)**

## Works Cited

2019-20 Diversity Report, System Office of Institutional Research, University of Colorado. June, 2020.

2020 Annual Report, Office of Contracts and Grants, Research & Innovation, University of Colorado Boulder.

Academic Futures Committee. *The Future of CU Boulder as a Public University: Embracing the Core Mission of Furthering the Public Good*. Report of the Academic Futures Committee, University of Colorado Boulder, 2018.

Altman, Joanne, et al. *Undergraduate Research: A Road Map for Meeting Future National Needs and Competing in a World of Change*. Washington D.C., Council on Undergraduate Research, 2019.

Jacobsen, Merna, et al. *Inclusion, Diversity, and Excellence in Academics (IDEA) Plan*. University of Colorado Boulder, 2019.

Kenny, Robert W. *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*. New York: The Commission, 1998.

Morrison, Janet A., et al. *Recognizing and Valuing the Mentoring of Undergraduate Research, Scholarship, and Creative Activity by Faculty Members: Workload, Tenure, Promotion, and Award Systems*. Washington D.C., Council on Undergraduate Research, 2019.

### \* Example Outcomes of Undergraduate Research

Data from CU Boulder's Biological Sciences Initiative (BSI):

- 96% of BSI-supported students graduated with their bachelor's degree
- 94% of BSI-supported students earned their bachelor's degree in STEM
- 89% of BSI-supported students who are underrepresented in science earned their bachelor's degree in STEM
- 66% of BSI-supported students have earned an advanced degree after graduating from CU Boulder with their bachelor's degree
- 47% of BSI-supported students have earned a terminal degree, including 11.8% from underrepresented minority backgrounds. Of 1,699 former BSI students, 801 have doctoral degrees, including 272 Science PhDs; 458 MDs or health-related doctorates; 35 MDs/PhDs; 14 Doctors of Veterinary Medicine; and 22 non-science terminal degrees (JD, EdD)
- 409 BSI-supported students have co-authored 518 peer-reviewed articles published in scientific journals (e.g., *Cell*, *Nature*)