

# A Successful University-wide Model of Undergraduate Research: Utah State University

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*Utah State University*

When Karlie, a first-year music major focusing on opera at Utah State University, wanted to get intensive study in vocal anatomy, which meant instruction in and access to the anatomy lab, we made a fairly easy match with the faculty member who oversees the facility. Karlie's rather unorthodox request was facilitated because she was a University Undergraduate Research Fellow. The Fellows Program recognizes students with a passion for a particular field of study before they enter the institution and offers them an annual stipend and support from the central Office of Research's Undergraduate Research Program. Karlie got the one-credit independent study course to study the parts of the body involved in production of sound, and the program paid the honorarium for the faculty supervisor.

## **Institutional Context**

Utah State University is a land- and space-grant research-extensive institution in northern Utah, 80 miles from the state capitol. The main campus is situated in Logan and the Cache Valley. The mountain valley is a metropolitan area of 100,000 residents. The university enrolls 23,000 students, the majority on the main campus but some 5,000 are distributed among regional campuses and distance education centers. Slightly more than 80% of the enrollment is undergraduate.

Over 200 undergraduate degree programs are offered. The University has seven academic colleges: Agriculture; Business; Education and Human Services; Engineering; Humanities, Arts and Social Sciences; Natural Resources; and Science. The University employs over 800 faculty members. Important research centers include the Space Dynamics Laboratory; Center for Persons with Disabilities; the Ecology Center; Center for Advanced Nutrition; Center for Integrated Biosystems; Utah Water Research Laboratory; and the Agriculture Experiment Station.

## **Undergraduate Research Fellowships**

The University Undergraduate Research Fellowship at Utah State is a signature program of undergraduate education and the Office of Research. The design of the program is for students who are interested in graduate or professional study following the undergraduate degree; who are ambitious; who may be interested in preparing for major fellowships such as the Rhodes, Truman, Goldwater, or Udall; and who want to make a difference in their communities and the world. The fellowship offers students the experiential learning that will result in dividends when applying for graduate study. We invite students who receive the institution's Presidential Scholarship to apply for the fellowship, and if they do so, they interview with faculty teams during a spring Scholars Day when we celebrate all students receiving a scholarship. Annually, we choose 30-40 students for the Fellowship program from a first-year class of approximately 2,500.

Fellowships extend across the campus and may be in any program. Fellows may work on assistive technology projects for the Communicative Disorders and Deaf Education department, do archival work in Special Collections on African-American wills in colonial Virginia, or join the electric snowmobile team. Karlie laid out a program of study that included language training in Italian, French, and German; study abroad; participation in opera productions; and knowledge of the larynx and lungs through her work in the cadaver lab.

The Associate Vice President for Research (AVP) oversees the Fellows at the university level, organizes the competition, makes the awards based on faculty recommendations, and evaluates the Fellows on a semester and annual basis. In addition, the AVP authored the guidebook that all Fellows use as a manual to their fellowship experiences. The Office of Research organizes university-wide meetings of Fellows, particularly in the beginning of each academic year. The AVP also does much of the public relations concerning the Fellows, including communicating with parents about their successes.

The Office of Research includes a marketing/public relations staff—primarily student interns—that produces several publications and press releases to tell the story of research overall and of the value of undergraduate research in particular.

Key to the Fellowship experience are the associate deans of the academic colleges, who have several responsibilities. They tend to have the crucial task of matching Fellow to faculty mentor. Usually this matching occurs very early in the fall term. The College of Science is an exception because it offers a weekly seminar to its Fellows who are exposed each session to a different research experience: computer science, the Center for Integrated Biosystems, the Center for Advanced Nutrition, insect lab, co-evolutionary biology, atmospheric studies, and so on. Fellows in Science may select a laboratory rather quickly or wait until the end of the term.

The associate deans bring their Fellows together as a community in socials and also spotlight them in college receptions and events. In some cases, department heads or undergraduate research advisors may also be involved, identifying potential mentors and projects. The faculty mentor works with Fellows on research, scholarly, or creative goals, providing space and equipment as needed to the Fellow. The mentor is largely responsible for inducting the Fellow into the “club” of research in the discipline, making transparent methodological approaches and educating the Fellow about responsible conduct of research and safety standards. The faculty mentor exemplifies what it means to be a scientist, social scientist, humanist, or artist—by action and word. The mentor is also the first line of defense if there are issues with the Fellow—personal problems, academic trouble, or cause for celebration.

Regular evaluation of the student to determine continuation of the fellowship occurs at the end of each academic year. The mentor is important not only for direct supervision of the Fellow but also for the crucial link the faculty member provides to the professional world: networks with other faculty at and beyond the campus; preparation for presenting at on-campus symposia or at regional and national professional meetings; letters of reference for awards and graduate school. The AVP shares with mentors helpful publications such as Merkel and Baker’s *How to Mentor Undergraduate Researchers* (2000) and *Entering Mentoring* (Handelsman, Pfund, Lauffel, & Pribbenow, 2005) developed by a team at Wisconsin and endorsed by the Howard Hughes Medical Institute.

Expectations for the Fellows are clearly articulated in their guidebook. The first one is communicate, communicate, communicate. Primarily this expectation refers to communication

with the mentor—defining roles and responsibilities—but it also means communicating with any other key personnel such as the associate dean, AVP, or director of Honors. Fellows, who wish to change majors, meet with the AVP to discuss strategies and options. Students who desire to change mentors or majors must do so diplomatically.

The Fellows by default serve as ambassadors for the undergraduate research program, a voice for the Fellows Programs. They participate on panels at the annual Scholars Day, telling prospective Research Fellows about their experiences, answering questions, and offering advice. We frequently call on them to represent the institution. For instance, at an annual luncheon for legislative spouses, we feature a particular college’s undergraduate researchers. Students from Psychology, for example, share posters of their work on guilt, media and adolescence, and strategies for success among stepfamilies in rural areas.

We also advise the Fellows to take advantage of opportunities in their field of study, such as department brown bags and guest lectures. We encourage study abroad and the Service Learning Scholars program if there is interest.

The Honors Program serves as an important support system for the Fellows, offering staff and peer advisors and advocating for Fellows on several fronts. A “scholarship prep” course helps all students interested in applying for prestigious fellowships, such as the Rhodes, including drafting applications and holding mocktail parties and dry-run interview sessions.

Fellows enroll in Scholars Forum, the gateway course in the Honors Program. Students do not formally matriculate into Honors until they have had a “taste of Honors” in their first term, which include an Honors general education course, possibly an Honors math course, and Scholars Forum, a one-credit, on-line module-based class. Scholars Forum enrolls all Honors-eligible students, approximately 18% of the entering class, and introduces them to opportunities at a research university. The Forum requires them to develop a goals profile, outlining academic, scholarly/research, leadership, physical, and personal goals. Too often, first-year students enter higher education without the social, cultural, and political capital to take advantage of opportunities. For instance, applying for a Rhodes Scholarship involves establishing a trajectory that begins in year one of an undergraduate’s career. The same holds true for many goals: obtaining a summer research fellowship or internship, graduating with Honors, getting into the professional or graduate school of choice, or gaining employment with a top company.

## Grant Programs

The Office of Research exists to help all students on campus, not just the Fellows. Multiple pathways exist for students to engage in hands-on learning on campus. The Undergraduate Research and Creative Opportunities (URCO) Grant Program is funded by the Office of Research through returned overhead. Two rounds of competition occur annually with orientation workshops prior to each. Faculty review teams evaluate the proposals and vote on funding. A proposal to create sculpture is just as likely to win support as a proposal to investigate the co-evolutionary relationship of salamanders and poisonous snakes. With a goal to fund as many proposals as possible, the Office of Research offers a liberal revision policy. Students who receive awards are treated just the same way as faculty investigators and receive information on fiduciary responsibility from the Budget Officer of Research. Reports detailing results and finances are due approximately six months following the award although extensions can be granted.

Summer fellowships offered on campus through foundation grants or national agencies are publicized through the office, and assistance is available to help with the application process. The National Science Foundation Research Experience for Undergraduates (REU) grants are particularly popular as are the American Heart Association fellowships. A student in Physics might spend the summer at Dartmouth studying nanotechnology, whereas another student might work on an autism project at the University of California-San Francisco.

## Curricular Innovations

Undergraduate research is present in the curriculum in several ways: methods courses, independent or directed study, and writing courses. The Office of Research instigated three approaches to support undergraduate research. First, at the instigation of the AVP, two faculty members revamped the research writing class (English 2010), which is a requirement for general education, to incorporate an introduction to research integrity, knowledge that any educated citizen should know. The compliance officer developed a course for advanced undergraduates and graduate students. This Research Integrity course focuses on the responsible conduct of research via case studies, and it addresses the following: mentor/mentee relationships; publications and authorship; conflicts of interest; scientific misconduct; data management; protection of human subjects; and the ethical care and use of

animals in research. This latter course has become part of a larger Graduate Student Certification program that also includes information on mentoring undergraduate researchers.

A university-wide course number is also available—USU 4900—in case a department does not have its own course for undergraduates to receive credit. Finally, a student may request a transcript designation as an “Undergraduate Research Scholar” at graduation.

## Dissemination and Travel

Research is not really concluded until the investigator has disseminated it. An annual celebration of student research, scholarship, and creative activity takes place each spring. This Student Showcase highlights oral and poster presentations from across campus. In addition, at that time awards are made on a college-by-college basis for Outstanding Undergraduate Researcher of the Year and Outstanding Undergraduate Research Mentor of the Year. A university fund-raising campaign, which includes the undergraduate research program, brought in an endowment to fund the student awards.

During each legislative session, the university takes its best students to the State Capitol Building where they explain their posters, which are displayed in the Rotunda, to their home district legislators. This event was created in 2001 when we became aware of legislators’ misperceptions about the role of a research university in an undergraduate’s education. “Research is a distraction from the business of teaching,” they said. A few years into the event, a key senator told the press, “there is no doubt about the value of a research university to an undergraduate’s education.” Mission accomplished.

Students also have the opportunity to share their work at the Utah Conference on Undergraduate Research (UCUR), which was established in 2007; the National Conference on Undergraduate Research (NCUR); and “Posters on the Hill” sponsored by the Council on Undergraduate Research. The Office of Research funds expenses associated with these events. For other professional conference presentations, student government supports travel through its Academic Opportunity Fund. The dramatic increase in the number of our undergraduates accepted to present at meetings in their field of study signaled a need for financial support. Fortunately, student government positively responded to a request from the Office of Research to consider setting up a parallel fund to the one that existed for graduate students. The number of requests for support continues to grow; as a result, the

research office has included travel support in its fund-raising campaign.

The Boyer Report (1998) on undergraduate education in research universities noted that “A research university is in many ways a city; it offers almost unlimited opportunities and attractions in terms of associations, activities, and enterprises” (p. 8). The goal of our Undergraduate Research Program is to assist in making those opportunities happen, just as we were able to find a place in the anatomy lab for an opera singer.

## References

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