

2010 ANNUAL REPORT

UNDERGRADUATE RESEARCH OFFICE

OF THE OHIO STATE UNIVERSITY



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Cover photos (clockwise from top left):

Zach Huttlinger; Haley Harrison and other Department of Dance students
with research collaborators in Burkina Faso; Ariana Hoet; David Young

Our students are delving into society's most pressing problems. They are truly working at the frontiers of their respective fields, and they do so with a great deal of creativity and determination. Their energy, enthusiasm, and tenacity make me proud indeed.

E. Gordon Gee, President, May 12, 2010

Whether our undergraduates work as paid assistants, volunteers, or independent researchers, they get a tremendous amount of real-world training while contributing to Ohio State's mission of generating new knowledge and serving society.

Joseph A. Alutto, Executive Vice President and Provost, November 15, 2010

We must certainly recognize the extraordinary achievements of our student researchers. At Ohio State, research plays an integral role in everything that we do, including teaching, outreach, engagement, and preparation of the next generation of scholars.

Caroline C. Whitacre, Vice President for Research, November 3, 2010

The optimal way to develop critical thinking skills, creativity, problem solving skills, and intellectual independence is by matching students with faculty in an innovation-oriented activity and individualized research.

We are extremely proud of the way our undergraduate students demonstrate "active learning through research" as they investigate and solve real-world problems.

Wayne E. Carlson, Vice Provost and Dean of Undergraduate Education, October 22, 2010

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Quotes from two undergraduate researchers in 2010:

More than anything, research provides me the opportunity to ask questions, wonder, and further my knowledge of the world around me.
Suzanne Tabbaa

I learned that I do research because it is the most exciting, tedious, painful, wonderful experience someone could ask for and it is completely and ridiculously amazing. The feeling as though you are on the edge of the future of medicine can be indescribable.
Mackenzie Schumer

The Undergraduate Research Office (URO)

Director: Dr. Allison Snow, Department of Evolution, Ecology, & Organismal Biology

Program Manager: Helene Cweren

Program Coordinator: Mike Bierschenk

Graduate Administrative Associates: Paul Patton, Monica Crary

Undergraduate Assistants: Benjamin Briskin, Daniel Hannah, Carla Justiniano, Jaqueline Lipphardt

2010-11 Faculty Advisory Committee

Richard Furnstahl Department of Physics

Susan Hadley Department of Dance

James Kinder Chair, Department of Animal Sciences

Ellen Mosley-Thompson Department of Geography

Director, Byrd Polar Research Center

David Tomasko Associate Dean for Undergraduate Education and Services, College of Engineering

Department of Chemical and Biomolecular Engineering

Linn Van Woerkom Assoc. Provost and Director of the Honors & Scholars Center (starting Aug. 1, 2010)

Department of Physics

Linda Harlow Assoc. Provost and Director of the Honors & Scholars Center (through July 31, 2010)

Department of French and Italian

Ex Officio Members:

Katherine Meyer Associate Provost, Office of Undergraduate Education

Department of Sociology (through 2010)

Wayne Carlson Vice Provost and Dean for Undergraduate Education

Department of Interior, Industrial, and Visual Communication Design

2010-11 Student Advisory Committee

Co-Chairs:

Ayla Cash Molecular Genetics
Kunal Parikh Chemical Engineering

Members:

Alisa Baron Spanish
Ashley Bartman Chemistry, Art History
Leah Batstone Music, Political Science
Samantha DeDios Psychology
Kurtis Feng Food Science
Dustin Gable Biomedical Sciences
Justin Hanson English
Mackenzie Hills Human Development & Family Sciences
Michael Isfort Biology, Microbiology
Anthony Kiragu Biology
Dominic Labanowski Electrical Engineering
Eric Langenderfer Chemistry
Jennifer McPhee Molecular Genetics
Emil Moldovan Psychology
Stephanie Moormann Anthropology, Molecular Genetics
Scott Moreland Physics, Mathematics
Matt Parriman Pharmaceutical Sciences
Chris Rasik Chemistry
Danielle Rickert Psychology
Kevin Ricks Pharmaceutical Sciences
Justin Schulze International Studies, Economics
Breonna Slocum Biochemistry
Ian Smith Biochemistry
Tessa Xuan Biochemistry
Daniel Zeleznikar Electrical Engineering

2010 Highlights

Established in 2006, the Undergraduate Research Office functions as a central clearinghouse for information and a voice for undergraduate research at OSU. We strive to open new horizons for interested students in all academic disciplines. Working closely with the Honors & Scholars Center, the URO has contributed to a surge of interest in research collaborations among students and faculty. OSU is recognized by **US News and World Report** as one of the best universities and colleges nationwide for undergraduate research and creative activities, along with 35 other public and private institutions. A few highlights from 2010:

- We estimate that our workshops, events, and short presentations in courses reached **3,200 students** in 2010, including ~25% of the freshman class. Approximately **4,000 students, faculty, and staff** receive email newsletters and announcements, also posted on Facebook and the URO website.
- Student participation in research is growing, as described in this report (see Table 1). For example, from 2007-2010 we see:
 - A **106% increase** in students enrolling for independent research courses (699 and H783)
 - **53% more** students presenting at the annual **Denman Undergraduate Research Forum** (540 students in 2010)
 - A **28% increase** in the proportion of Rank 4 students who worked on a research project, based on a national survey. In 2010, 36% of OSU respondents had done research or planned to do so
- An all-time high of 281 students took part in the **URO Summer Undergraduate Research Institute**, and 97 students gave presentations at the URO-sponsored **Fall Undergraduate Research Forum**.
- The student-led, peer-reviewed Journal of Undergraduate Research at Ohio State, known as **JUROS**, was launched. The first edition of **Oculus**, a hard-copy selection from **JUROS**, was published in May 2010.
- Our proposal to establish a **new undergraduate research thesis** option for non-honors students was approved by the University Senate, pending a vote by the Board of Trustees. Under the new plan, students may graduate with **research distinction** or with **honors research distinction**.
- I gave three presentations at national meetings and published an article titled “Low-cost Strategies for Promoting Undergraduate Research at Research Universities” in **PEER**, a journal of the **American Association of Colleges and Universities**.

As Director, I greatly appreciate the many contributions of our Program Manager, Helene Cweren, as well as Mike Bierschenk, Paul Patton, Monica Crary, and a large crew of extremely enthusiastic students, including Amanda Harper, Leah Batstone, Carla Justiniano, Alex Liber, Ayla Cash, Kunal Parikh, Brandon Boucher, Jackie Lipphardt, Ben Briskin, Hudson McFann, and James Treadway. We are also fortunate to have excellent assistance from our Faculty and Student Advisory Committees, the Office of Academic Affairs, and the Office of Research. Ohio State’s increasingly talented pool of undergraduates, combined with world-class resources for research, should lead to continued growth in faculty-directed student research projects. We are excited to be able to support a campus-wide culture of helping students get involved in research.



Dr. Allison A. Snow
URO Director and Professor of Evolution, Ecology, & Organismal Biology

Strategic Plan for the Undergraduate Research Office

MISSION

The Undergraduate Research Office (URO) coordinates opportunities for undergraduates to engage in meaningful research at The Ohio State University, a top public research university. The URO promotes many types of research-related activities in all academic disciplines.

VISION

We seek to more fully integrate the dual missions of research and teaching at Ohio State, to enrich the undergraduate experience, and to become known as a national leader of campus-wide undergraduate research programs.

ACTIVITIES

- Introduce students to rewarding research experiences
- Help students find faculty mentors and funding
- Help students present their findings at local and national symposia
- Support the Denman Undergraduate Research Forum
- Promote recognition of student research accomplishments
- Help forge new connections between teaching and research at OSU

CURRENT STATUS OF THE UNDERGRADUATE RESEARCH OFFICE

Staff: 75% time Program Director (Professor Allison Snow)
75% time Program Manager (Helene Cweren)
Full-time Program Coordinator (Mike Bierschenk)
50% time Graduate Administrative Assistant (Paul Patton, Monica Crary)

Budget for FY 10-11: \$370,827 for salaries, benefits, fellowships, supplies, and services

The Undergraduate Research Office offers year-round programming to facilitate and promote undergraduate research. We are a small office with a very large mission that contributes to recruiting and educating highly motivated students in all fields of study. Much of our work is carried out in collaboration with other academic units, especially the Honors & Scholars Center. Our annual budget supports the costs of four office rooms in Page Hall, computer services, publicity, brochures, maintaining the URO website, hosting workshops and other events, wages for part-time student workers, \$21K for six summer research fellowships (matched by \$21K from the Office of Research), and travel by the director and program manager to at least one professional meeting per year. This funding is adequate for our current needs, but additional funds will be required to provide better and more easily obtained research experiences for our students (see Appendix E on Priorities for Donors).

Other major sources of annual funding for undergraduate research include >\$650K for honors thesis scholarships (distributed by college committees), \$25K for educational enrichment grants (distributed by the Undergraduate Student Government), summer programs offered by other units, and funds from many other decentralized programs. The annual Denman Undergraduate Research Forum is funded by the Honors & Scholars Center (Office of Undergraduate Education), the Office of Development, and the Office of Research, and is organized by the Honors & Scholars Center.

LONG-TERM GOALS AND BENCHMARKS

We plan to become known as a national leader in promoting undergraduate research at large public universities. Within the next ten years, we hope that the great majority of qualified students who seek an independent research experience will have this opportunity. Research experience is especially valuable for students in the STEM disciplines (Science, Technology, Engineering, and Mathematics), which are the focus of state and national initiatives to sustain science-related professions. We will also strive to increase research participation in the social and behavioral sciences, arts, and humanities, and to further strengthen undergraduate education throughout the newly configured College of Arts and Sciences.

To take full advantage of OSU's status as a top research institution, the URO seeks to develop a coordinated program that will allow more undergraduates to gain meaningful research experiences designed for both honors and non-honors students. Most funding for undergraduate research activities is decentralized, provided at college, school, and department levels. Across campus, funding for undergraduate research is insufficient and is not permanent, fluctuating from year to year. In particular, we urgently need funding for students' summer research opportunities and travel to give presentations at professional meetings.

Benchmarks as of January 1, 2009:

- During the next five years, we expect participation in OSU-sponsored undergraduate research forums to increase each year. (This includes the Denman Undergraduate Research Forum and others.)
- During the next five years, we expect the numbers of students who complete a thesis and graduate "with research distinction" to increase each year.
- During the next five years, we expect the numbers of students who receive academic credit for research to increase each year.
- By 2013, we expect to see increases in the numbers of Rank 4 students in the STEM fields who have participated in research. Progress will be assessed using data from the 2013 National Survey on Student Engagement, described below.
- During the next five years, we expect to generate additional funds from private donors and extramural grants to support undergraduate researchers.

PLANS FOR MEETING LONG-TERM GOALS

Some of our long-term goals and benchmarks can be attained by strategically focusing current resources and staff time on these priorities. However, current funding for running the Undergraduate Research Office limits possibilities for expanded services and new initiatives. Given the current fiscal climate, we propose that additional funding be obtained from private donors and extramural grants.

We are collaborating with other units on campus to obtain federal grants and foundation awards for undergraduate research. For example, our office supported a successful undergraduate research training grant from the National Science Foundation for the Departments of Evolution, Ecology, and Organismal Biology; Mathematics; and Statistics (funded at \$980K) and we received a Beckman Scholars Award to fund undergraduate researchers in the Departments of Chemistry, Biochemistry, and the School of Biomedical Science (\$115,800) in 2009. OSU should be competitive for funding from the Howard Hughes Program and National Science Foundation programs within "Alliances for Broadening Participation in STEM." We will continue to pursue external sources of funding at every opportunity.

Metrics that will be used to assess progress toward these benchmarks are discussed in the next section.

Metrics of Participation in Undergraduate Research

The data shown in Table 1 are among the most reliable indices we have found for evaluating trends in the numbers of undergraduate researchers at OSU. We view these data as **indicators** of research activity rather than comprehensive summaries. A complete accounting of undergraduate research is difficult because many research projects do not culminate in a thesis or a presentation at the Denman Undergraduate Research Forum, and a great deal of research activity is not reported by academic departments or colleges. Each year, many undergraduates are coauthors of journal publications and papers presented at professional meetings, but we have no reliable methods for comprehensively monitoring these achievements. In the future, we hope that more complete data will become available, for example when reporting through *OSU:pro* is required for all faculty members' annual activity reports. Currently, this is only required for new faculty and promotion and tenure dossiers, but some colleges are beginning to require all faculty to use *OSU:pro*.

PRESENTATIONS AT THE DENMAN UNDERGRADUATE RESEARCH FORUM AND OTHER EVENTS

In 2010, participation in the **Denman Forum** increased to an all-time high of **540 students**. About 66% of the presentations were given by honors students, and 64% of presenters were in Arts and Sciences (Table 3).

Overall, we estimate that more than **1,280 student presentations** were given at OSU in 2010, a 13% increase over 2009 (Table 2). Many students gave presentations at the Undergraduate Juried Art Exhibition and research forums sponsored by colleges and departments. This was the first year that the **College of Engineering** sponsored an Undergraduate Research Forum, with 35 participants. Fifteen students presented posters at OSU–Newark. Participation in the **Fall Undergraduate Research Forum**, now in its third year, jumped from 66 students in 2009 to **97 students** in 2010.

RESEARCH THESES

In 2010, **292 students completed an honors thesis** and graduated “With Distinction,” which is similar to the number in 2007 but higher than intervening years (Table 1). Table 3 shows the proportion of honors thesis in different disciplines. More than half were written by students in the Arts and Sciences, including a substantial number in the arts and humanities (~20%).

The URO is working with the Honors & Scholars Center, the College of Arts and Sciences, and others to find ways to increase the numbers of students who complete an honors thesis. In Spring Quarter, we conducted a survey of honors students to identify barriers to completing a thesis (see Appendix A). These findings will be helpful as we improve the process for honors students and add a **new thesis option** for non-honors students.

In January 2011, the University Senate approved our proposal to change the Faculty Rules to allow non-honors students who complete a thesis to graduate with **research distinction** and benefit from having this recorded on their academic transcript. Honors students who complete a thesis will graduate with **honors research distinction** on the transcript. Information about the new undergraduate research thesis option is posted on the URO website, and our office will continue to serve as a central resource for implementing the university-wide guidelines.

ENROLLMENTS FOR RESEARCH CREDIT

We are encouraged to see that enrollments for research credits continue to grow. The numbers of students who received credit for honors thesis research (H783 courses) and research (699 courses) **increased by 23% and 25%**, respectively, in 2010 compared to 2009 (Table 1). We are pleased to see a **106% increase** of students enrolled in research course (699 and H783) over the past three years.

NATIONAL SURVEY FOR STUDENT ENGAGEMENT (NSSE)

The National Survey for Student Engagement, which is administered every three years, provides another indicator of increasing participation in research at OSU. Data from NSSE have the advantage of being drawn from a large, representative sample of Rank 4 students, most of whom are seniors. Students are asked if they have **“worked on a research project with a faculty member outside of course or program requirements.”** Between 2007 and 2010, the percentage of students who answered “yes” to this question increased from 20.8% to **26.0% in Arts & Sciences**, from 14.4% to **17.5% in Professional Schools** other than health sciences, and from 17.5% to **22.4% overall** (Table 1).

By 2010, participation in research was especially high in natural and mathematical sciences (45.6%), allied medical professions (35.4%), engineering (23.9%), and social and behavioral sciences (23.8%). In addition, across disciplines another 13.6% of students in the 2010 survey reported that they “plan to” work on a research project, for a total of **36.0% who have either done research or plan to**. Those who “plan to” do research were probably juniors who had Rank 4 status due to accelerated progress and having completed AP courses in high school.

NUMBER OF STUDENTS IN PAID SUMMER RESEARCH PROGRAMS AT OSU

Table 4 shows the numbers of students in various summer research programs at OSU, with totals of more than **100 students** during each of the past five years. Most of these students received scholarships or stipends (~\$3,000–\$5,000) for full-time research with an OSU faculty member during Summer Quarter. Although the numbers of students in some programs declined, other opportunities have increased. Given the large pool of highly qualified and motivated applicants who were denied funding in 2010, we hope to see these numbers increase substantially over the next few years by increasing extramural funding and contributions from donors. Unfortunately, some academic units may be forced to withhold financial support for summer researchers in 2011 due to smaller budgets.

Students who are funded by individual faculty members are not included in Table 4. Based on participation of students in the Summer Undergraduate Research Institute, we estimate that at least **100 additional OSU student researchers** were supported by individual faculty members and other sources during the summer. Moreover, an unknown number of OSU students conducted summer research at other institutions.

NUMBER OF OSU FACULTY WHO USED THE URO WEBSITE FORM TO FIND STUDENT RESEARCHERS

About 53 faculty members used our targeted email announcements to find undergraduate researchers in 2010, which is similar to 51 in 2009. We have received great feedback about their success in finding talented, well-matched students. We hope these numbers will continue to rise as more faculty, postdoctoral researchers, and senior-level graduate students learn about our service. This approach is especially useful for new faculty and those in the College of Medicine and other large research centers who have little personal contact with undergraduates.

Table 1. Metrics of student participation in undergraduate research, 2003–2010

	2003	2004	2005	2006	2007	2008	2009	2010
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Number of Denman Undergraduate Research Forum presenters

Total number of students	231	276	326	354	354	415	522	540
Increase over previous year (%)	-	19%	18%	9%	0%	17%	26%	3%
Percent who were honors students	-	77%	65%	66%	73%	71%	68%	66%

Number of honors theses¹

(per academic year; AY2003 is summer 2002–spring 2003)

Total number of theses	236	292	276	277	295	285	271	292
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Number of students enrolled for credit²

(total enrolled per academic year; AY2003 is summer 2002–spring 2003)

Total Research & Independent Study (H783, 699, 693)	5619	6160	6399	6306	6351	6011	6670	6735
Independent Study (693) ³	4877	5393	5572	5478	5378	4664	5061	4731
Honors Research (H783)	688	701	711	680	631	660	668	819
Research (699) ⁴	54	66	116	148	342	687	941	1185
Total Research Enrollment (H783, 699)	742	767	827	828	973	1347	1609	2004

“Have you worked on a research project with a faculty member outside of course or program requirements?”

National Survey of Student Engagement, administered every 3 years⁵

Percent of Rank 4 OSU students answering "yes" (number of responses in parentheses)

All Students	-	19.0% (447)	-	-	17.5% (861)	-	-	22.4% (2434)
Arts and Sciences	-	19.4% (216)	-	-	20.8% (384)	-	-	26.0% (1184)
Health Sciences	-	*	-	-	*	-	-	26.7% (221)
Other Professional Schools	-	18.6% (210)	-	-	14.4% (400)	-	-	17.5% (1018)

1. Data from Anne Krabacher, Honors & Scholars Center; Columbus campus data

2. Data from Linda Katunich, University Registrar; Columbus campus data

3. Not all Independent Study (693) credits are used for research

4. Non-honors research credit (699) was a new option in AY2003

5. Data from Sheila Craft, Office of Academic Affairs; Columbus campus data from 2004 (random sample), 2007 (random sample), and 2010 (complete census; 25% response rate)

* Too few responses

Table 2. Numbers of research and creative activity presentations at OSU, 2009–2010

Quarter	Event	2009¹	2010¹
Winter	Dept. of Art BFA Exhibition	-	16
Spring	Denman Undergraduate Research Forum – all disciplines	522	540
Spring	Undergraduate Research Forum at OSU Newark – all disciplines	9	15
Spring	Arts & Sci - Natural & Math. Sciences Undergraduate Research Forum	85	106
Spring	Arts & Sci - Social & Behav. Sciences Denman Preview	7	-
Spring	Arts & Sci - Arts & Humanities Undergraduate Research Colloquium	9	6
Spring	College of Education & Human Ecology Honors Poster Presentations	12	57
Spring	College of Engineering Undergraduate Research Forum	-	35
Spring	College of Food, Agr., & Env. Sciences Undergraduate Research Forum	36	29
Spring	College of Nursing Undergrad Research Night	26	-
Spring	Undergraduate Juried Art Exhibition ²	200	200
Spring	Dept. of Art BFA Exhibition	21	52
Spring	Dept. of Design Spring Exhibition	35	54
Spring	Student Generated New Work (Theatre) ³	6	-
Spring	Dept. of East Asian Lang. & Literatures Undergrad Research Forum	9	6
Spring	Dept. of Psychology Undergrad Research Colloquium	24	19
Spring	OSU Medical Center Research Day	9	8
Summer	Plant Molecular Biology and Biotechnology - SURE Poster Session	20	2
Summer	SROP Ohio State (sponsored by the Graduate School) ⁴	9	6
Summer	Research on Research Student Showcase (sponsored by TELR ⁵)	10	-
Autumn	Dept. of Art BFA Exhibition	-	23
Autumn	School of Earth Science - Shell Undergraduate Poster Forum	20	9
Autumn	Fall Undergraduate Research Forum (sponsored by URO)	66	97
TOTAL number of students¹		1135	1280

1. Some students presented at more than one event

2. Juried to 200

3. Undergraduate playwrights

4. OSU students in the CIC Summer Research Opportunities Program at OSU

5. Technology Enhanced Learning and Research, now a part of Learning Technology Services; program discontinued in 2010

Table 3. Percent of honors theses and Denman poster presenters by college or school

(based on the college of the student's major; honors theses listed per academic year;
AY2008 is summer 2007–spring 2008, etc.)

	Honors theses 2008	Honors theses 2009	Honors theses 2010	Posters 2008	Posters 2009	Posters 2010
Arts and Sciences	64%	57%	59%	57%	57%	64%
Biological Sciences	14	10	11	17	16	25
Social and Behavioral Sciences	19	19	18	18	17	15
Math and Physical Sciences	8	6	7	10	9	10
Humanities	12	14	12	7	8	7
Arts	6	7	8	5	6	6
Other	4	1	3	<1	1	1
Engineering	9	14	14	11	14	15
Food, Agricultural, and Env. Sciences	5	4	5	8	8	7
Allied Medical Professions	3	6	7	10	10	5
Education and Human Ecology	6	7	5	6	2	3
Nursing	4	5	4	3	3	3
Architecture	4	5	4	3	3	2
Pharmacy	4	2	2	1	1	1
Business	2	2	1	1	1	1
Total number of theses or presenters	285	271	292	415	522	540

Table 4. Summer undergraduate research internships at OSU, 2006–2010

(Numbers of OSU students with scholarships/stipends; typically 10 weeks @ 40 hours per week.)

Program	2006	2007	2008	2009	2010
URO Summer Undergraduate Research Fellowship	-	-	12	16	13
Psychology–URO Summer Undergraduate Research Fellowships	-	-	-	-	2
Karen A. Holbrook Fund (URO and Study Abroad)	-	-	1	-	2
Summer Research Scholarships (Honors & Scholars)	18	13	7	6	8
Mayers Summer Research Scholarships (Natural & Mathematical Sciences)	-	10	14	13	14
URO Beckman Scholars Program in Biochemistry, Chemistry, & Biomedical Science	-	-	-	3	6
Research on Research (Learning Technology Services)	12	10	9	10	-
CIC Summer Research Opportunities Program (including STARS program)	36	20	11	8	9
American Heart Association/ Davis Heart & Lung Research Institute SURF	-	-	-	-	6
Biochemistry Summer Undergraduate Research Program	4	4	4	4	7
Earth Science – Shell Undergraduate Research Experience	-	-	8	20	10
Astronomy Dept. Summer Undergraduate Research Program	3	6	6	7	7
Physics Dept. Summer Research Interns	8	4	7	7	10
Biology – Stone Laboratory REU (not paid positions)	6	6	9	7	5
Plant Mol. Biology & Biotechnology SURE	4	4	3	3	3
Plant Pathology Dept. SRIPP	5	7	5	4	6
College of Engineering/Engineering Experiment Station	4	2	2	2	2
Dentistry – Dr. Rudy Melfi Research Fellowship	5	2	3	5	3
Pharmacy Summer Research Fellowship	5	4	5	4	6
NSF REU Mathematical Biosciences Institute	5	4	-	-	7
NSF REU Site – Molecular Genetics & Biochemistry	-	3	6	8	2
NSF REU Site – Chemistry/Biology Interface	-	1	-	-	-
NSF Nanoscale Science & Engineering Center IGERT	-	7	2	1	2
NSF REU – Sociology	-	-	-	5	-
Other	-	-	3	2	-
Total OSU students	115	107	105	119	130

Year-Long Programming for OSU Undergraduates

Helene Cweren, Program Manager

OVERVIEW

The URO offers a full year cycle of programs to encourage and support student participation in research. We estimate that our workshops, events, and short presentations in GEC courses reached approximately 3,200 students in 2010, a 7% increase over 2009. Autumn Quarter presentations to freshman survey courses reached more than 1,600 students, representing ~25% of the freshman class. Over the course of the year, URO staff and volunteers presented or participated in nearly 20 outreach events each month.

2010 URO Programs – Academic Year	Autumn	Winter	Spring
Informational Presentations/Workshops			
Monthly Information Sessions	X	X	X
Research with Human Subjects: IRB Training	X	X	X
International Research Panel or Info Session	X		X
Finding Grants for Research		X	
Poster Presentation Basics	X		X
Library Special Collections			X
Summer Research Opportunities – Planning Ahead	X		
Q & A for Summer Research Opportunities		X	
Student Panels			
Spilling the Beans (How and Why I Do Research)	X	X	
Table Talks: Peer Research Discussion by Field		X	
First Year Experience Success Series (How to Get Started)	X		
Honors Thesis or Not?			X
Ins & Outs of Summer Research	X		
Faculty Panels			
Mershon Faculty Panel (social and political science)	X		
Faculty Perspectives on Undergraduate Research	X		
ESUE Colloquium (The OSU-India Connection)		X	
Co-presentations with Honors & Scholars			
Intro to the Denman Forum		X	
How to Write a Research Abstract		X	
Poster Presentation Basics			X

Our programs attract high attendance and receive positive feedback on evaluations. We offer standard programs during the academic year (see below), and at times we introduce new programming and collaborate with other offices. For example, this Autumn we introduced a new workshop on finding and applying to summer research programs outside of OSU using internet searches. In Winter 2010, the URO was approached by Les

Tannenbaum, Associate Professor of English, who requested our collaboration in his section of English 269, Introduction to Digital Media. Dr. Tannenbaum's students produced short documentary videos about student researchers in Spring and Autumn quarters, while URO staff provided coordination and feedback to the student producers. The collaboration was quite successful; in addition to teaching students about their research-oriented peers, the class yielded several exciting videos which were used during Orientation 2010 and posted to the URO website.

In addition to scheduled programs, we offer individual advising, both walk-in and by appointment. URO Peer Research Contacts, who receive coaching and supervision from our office, are also available to students who have questions about getting started. Peer Research Contacts are listed by discipline on our website. These student researchers answered 72 student email inquiries in 2010.

Collaborators

We gratefully acknowledge the ongoing contributions of the Honors & Scholars Center, the Office of Responsible Research Practices, the Office of International Affairs, the University Center for the Advancement of Teaching, Career Connection, University Libraries, the Division of Natural and Mathematical Sciences, the Department of Psychology, Stone Laboratory, the Mershon Center for International Security Studies, and others to our year-long programming.

Evaluations

We distribute, collect, and summarize evaluation forms at each URO-sponsored event. This feedback has been very helpful for improving our programs. In addition, the Student Advisory Committee, which meets twice each quarter, gives the URO staff feedback on events as well as advice on proposed programs.

Student Involvement in the URO

Students' enthusiastic participation is an essential part of the URO. Interested students have the option of getting involved as Peer Contacts, Student Advisory Committee Members, staff of the Journal of Undergraduate Research at Ohio State (*JUROS*), panel speakers, and volunteers at URO-sponsored events. We host a spring celebration each year to recognize the many contributions of our students to OSU's undergraduate research program. The 2010 spring celebration was a particularly notable event because we combined it with the launch of *Oculus* (see update on *JUROS* and *Oculus*) and invited esteemed guests including President Gordon Gee, Richard and Martha Denman (founders of the Denman Forum), Dr. Wayne Carlson, and Dr. Linda Harlow.

Presentations and Fairs

In 2010, we participated in 32 major events around campus, including 5 campus fairs, and multiple presentations to student, staff, and faculty groups. In addition, we gave 37 presentations to freshman survey courses throughout the year.

Consultations

The URO has developed expertise in reaching out to and working with undergraduate researchers, and this expertise has not gone unnoticed. Increasingly, the URO is being consulted by other campus offices for help and advice on implementing new undergraduate research programs and/or scholarships.

For example, in 2010 URO staff shared application materials and implementation advice with the new Pelotonia Undergraduate Fellowship Program and with the American Heart Association Summer Undergraduate Research Fellowships sponsored by Dr. Richard Gumina of the Davis Heart & Lung Research Institute. We also worked with Dr. Melinda Wright in the Office of Undergraduate Education on laying the groundwork for a pilot program in community-based undergraduate research next summer.

The URO also frequently assists other campus offices with outreach and advertising. In the past year, we have partnered with offices such as the Office of Diversity and Inclusion, the College of Arts & Sciences, the Department of Statistics, and ROTC programs in order to connect them and their resources to a broad student base. It is also not uncommon for the URO to receive requests from other universities for advice on building an

undergraduate research program; Allison Snow and Helene Cweren traveled to national conferences to give presentations on these topics. Through these consultations the URO strengthens our inter-office connections, impacts the university culture, and promotes undergraduate research at OSU and beyond.

AUTUMN QUARTER

Much of our effort during the Autumn Quarter is devoted to outreach. This year we gave 35 presentations to freshman survey classes, hosted two First Year Experience Success Series Panels and two Honors & Scholars talks, and participated in three campus fairs.

The main URO event during the Autumn Quarter is the **Fall Undergraduate Research Day and Student Poster Forum**, held in 2010 on Friday, October 22, in the new Ohio Union. The purpose of this event is twofold: to allow students to present research from the previous summer, and to introduce incoming students to research opportunities at OSU. In 2010, **97 students** presented posters, compared to 65 in 2009 and 28 in 2008. We expect this poster forum to continue to grow as more faculty and students become aware of it.

We estimate that 450 students, staff, faculty and guests attended and viewed the Fall Poster Forum in the afternoon, and 130 attended the six panel discussions which were offered in the morning.

Based on survey responses from 43 student presenters, we found:

- 89% were in their 3rd or 4th year at the university
- 58% were presenting a poster for the first time
- 60% reported that they had been conducting their research for a year or more
- 98% expected to continue with their research in the coming quarters
- 77% were Honors students
- 53% utilized the URO's website when working on their poster
- 27% of those who presented had attended a poster presentation workshop during the summer or fall (this is not based on the surveys)
- 49% reported that their faculty advisor stopped by to see their poster at the Forum
- 81% rated the overall value of presenting at the Poster Forum as above average or excellent
- 84% ranked the overall quality of the Poster Forum as above average or excellent

From the surveys, we also identified some areas where we can improve:

- Need a bigger space
- Many students would like to be judged

WINTER QUARTER

In addition to our regular programs (see chart, p.9), we offer several Winter Quarter events that involve other offices at OSU, including pre-Denman Forum workshops with the Honors & Scholars Center. The "headline" URO program is part of the campus-wide Colloquium on Globalization & Sustainability, sponsored by the Office of Undergraduate Education. Our very successful program and theme in 2010, **Research Across Continents: The OSU-India Connection**, had 50 students in attendance. This event included three speakers—two faculty members, one graduate student, and one undergraduate student—who had conducted research in India, all from different disciplines. Their presentations led to lively discussions that continued during a reception.

SPRING QUARTER

The highlight of Spring Quarter is the **Denman Undergraduate Research Forum**. While the Honors & Scholars Center continues to organize the overall forum, the URO is actively involved in planning, publicizing, and co-hosting this nationally known event. The URO schedules pre-Denman workshops and markets the event on

campus. Starting in 2008, we developed a new set of publicity posters to encourage more students and faculty to attend the forum. We also coordinate the Distinguished Undergraduate Research Mentor Awards to recognize the role of faculty in undergraduate research (see Appendix D).

SUMMER QUARTER – The Summer Undergraduate Research Institute

The Summer Undergraduate Research Institute (SURI) provides ongoing communication and support, professional development and social programs, and a sense of community for undergraduate researchers on campus. Students in formal programs and those working independently with a faculty mentor are all welcome to participate. In 2010, we also encouraged registration from OSU undergraduates conducting research outside of OSU (e.g. at other universities or abroad) for the first time.

Participation in SURI	2008	2009	2010
Total # of participants	195	255	281
% change	–	+31%	+10%
% in formal programs	–	67%	63%
% from other universities	10%	17%	16%
% in STEM disciplines	83%	89%	87%

SURI 2010, the third year of the program, included 281 total students, 236 of whom were OSU students. Of the OSU students, 89% stayed at OSU or in the Columbus area, and 11% were conducting research elsewhere.

Participation in summer 2010 increased by 10% from 2009 and a total of 44% from 2008, the year SURI began. Only 13% of students conducted research outside of STEM disciplines, consistent with the fact that there are far fewer formal programs and funding opportunities for these students.

SURI Recruitment

Recruitment for SURI occurs during the Spring Quarter when campus-wide communication is still possible. To reach potential participants, we:

- 1) Invite other summer research programs on campus to be listed as official supporters of SURI (16 participated in 2010). Supporting programs shared their lists of summer undergraduate students and email addresses, allowing us to contact our target audience. For the first time, we distributed brochures about SURI around campus and several offices sought out SURI inclusion for undergraduate researchers in their disciplines.
- 2) Directly recruit undergraduates through our usual communication channels, such as the URO email listserv, Buckeye Net News, campus advisors, H&S Net, etc. A drawing for Barnes and Nobel gift certificates is used as an incentive to encourage self registration in SURI.

SURI Programming

Summer programming emphasizes professional development opportunities, along with a few social and sports activities. Attendance at events this summer was excellent, with most programs filled to capacity. Programs offered included the following, in order from most to least attended:

- Kickoff Dinner and Ice Breaker Activities
- Undergraduate Research & Applying to Graduate/Professional School Panel
- Personal Statement Workshop
- Weekly Brown Bag Lunches on the Oval
- August Research Progress Celebration
- Poster Presentation Workshop

- Research Integrity Workshop
- Resume/Cover Letter Workshop
- How to Write a Research Abstract (new in 2010)

The URO continues to partner with other offices across campus (e.g. Career Connection, University Center for the Advancement of Teaching, and the Office of Responsible Research Practices) to provide expertise and to present many of the above professional development workshops, increasing cross-campus cooperation and awareness of undergraduate research on campus.

For the first time, we saw a synergistic effect of SURI programming: SURI students were invited to attend a professional development workshop offered by one of SURI's partner programs. The Center for Emergent Materials sponsored a program titled "What Can I do with a PhD?" for its summer undergraduate researchers and invited interested SURI participants to attend. Also a first, the URO invited two faculty members (Dr. Mark Drew, Infectious Diseases; and Dr. Katherine Meyer, Sociology) to join students on the Oval at lunchtime to learn more about faculty research at OSU. In response to positive feedback regarding these visits, we plan to increase the number of faculty visits in the coming summer.

The URO again encouraged involvement in sports, including intramural softball and volleyball teams as well as informal ultimate Frisbee games. Sports activities were advertised by the URO but organized by SURI participants. Sports involvement continues to provide an excellent way for student researchers to balance their time doing research and to meet one another over the summer quarter.

Ultimate Frisbee was a blast, and a great way to relieve stress.

The intramurals were a great way to get to know fellow researchers and have some fun.

In addition to the above events, SURI participants received weekly emails from our enthusiastic student coordinators Alex Liber and Brandon Boucher. These emails included program updates and advice in the form of a "topic of the week." This year's topics included: Adjusting to the Research Life, Getting to Know your Mentor, Roadblocks in Research, What Else We Learn from Research, How's it Going?—A Message from Dr. Snow, The Dreaded Abstract, Data Collection and Analysis, and Becoming a Leader in Undergraduate Research.

SURI Assessment

At the end of the Summer Quarter, we administered two exit surveys using Zoomerang, one for student participants and another for their faculty advisors. Student surveys generated a 25% response rate (71 replies) and faculty surveys a 25% response rate (28 replies).

Student responses:

Students' favorite SURI programs were the opening kickoff event, the personal statement workshop, and the panel discussion on Applying to Graduate/Professional School. 30% reported that this was their first experience doing research, while 9 out of 10 respondents were in their last two years at OSU. 79% reported conducting summer research in a lab; 74% intend to publish or present their summer research. 97% indicated that the emails they received from the URO were helpful; the survey results suggest that email is the main form of information for SURI students, as only 21% indicated that they checked the website once or more a week. 97% said they would recommend SURI to other students.

The survey results suggest three areas where students would like to see improvement:

- The time of day when SURI programming is offered
 - *Stagger the times for events a little more...I am usually stuck in the lab until 6 or 7 and that is usually when your events are over.*
 - *The only thing that could improve SURI is moving more events to later in the day.*
- The number of social activities
 - *A few more social events...*
 - *...focus more on low-key social gatherings...I know I learn a lot from just talking to people...*
- Providing more specific programming (vs. general or introductory programs).
 - *More specific topic groups*
 - *...I feel like most of the SURI events are beneficial for students just starting their research, but not so much for experienced students. Also, the workshops are usually not specific enough...*
 - *Have some classes on things for older students...*

Faculty responses

Data showed that faculty advisors had, on average, 1.9 undergraduates conducting research under their supervision. 39% of them reported that their student researchers discussed their SURI involvement, and all of them said that they would recommend SURI to other undergraduate researchers. 84% indicated that the email communication from our office was helpful. This is good to know as this was the first year in which we had any formal email communication with faculty (an outcome of feedback from last year's faculty survey).

We received few comments from faculty members, but it was clear from this small group that there is still a great deal of misunderstanding among faculty about what SURI is, what the goals are, and even about our contact with them. It may be necessary for the URO to rethink how we communicate with faculty who advise students in SURI.

Publicity and Marketing

GOALS

As a campus-wide office, we strive to make our services known to a large portion of the OSU community. We use a variety of digital and non-digital, passive and active methods to stay in touch with students, depending on the target audience and the type of announcement. Students begin hearing about undergraduate research while they are still in high school through the Office of Admissions, and we aim to serve their needs throughout their undergraduate years. Likewise, we strive to reach new and established faculty who may be interested in serving as research mentors, as well as administrators who can collaborate with us to promote undergraduate research. We are constantly seeking new strategies for making our services available to a larger portion of the OSU community. Our main venues for publicity and marketing are described below.

THE URO WEBSITE

<http://undergraduateresearch.osu.edu>

The URO website serves as a comprehensive, centralized, one-stop location for finding out about undergraduate research in general and more specifically about opportunities for OSU students. We continue to receive queries from colleagues at other universities who also make use of our website. Informal feedback indicates that we have one of the most useful websites available for campus-wide undergraduate research offices. An outline showing the basic structure of the website's organization is included in Appendix F.

The website is updated frequently to provide students at all stages of research involvement with needed resources and information. The more we learn about the undergraduate research population at OSU, the more we are able to modify and add to the website to meet their needs. Original information on the website developed four years ago covered introductory topics, such as what research is and how to find research opportunities at OSU. New sections have been added to facilitate specific tasks such as producing a research poster or writing a research proposal. We also added pages to feature new services, such as the Peer Research Contacts and the online form to help faculty recruit student researchers. Pages to publicize the accomplishments of student researchers, a link to facilitate donations, and links to JURIS and the OSU Beckman Scholars Program have also been added.

Efforts to make the website more user-friendly are constantly considered and implemented when possible. The ability of the URO to technically manage and update its own website has been central to the success of the office.

EMAIL LISTS AND TARGET GROUPS

Our students and faculty are very responsive to email messages and the following methods allow us to reach them.

Undergraduate Research Office Email Updates

Approximately **4,000 students** have joined this list to receive announcements about URO programs, related events, and research opportunities. Several faculty, staff, and academic advisors have also joined. Students can sign up at outreach events such as the Student Involvement Fair and URO-sponsored programs, or through our website. An "unsubscribe" option is offered with each outgoing message.

As part of our evaluation at URO events, we ask attendees where they heard about the event; data from the past year showed that 56% heard through email—the number one source for finding out about our events.

Likewise, 97% of SURI participants indicated that they found the emails helpful. One respondent summed it up as follows:

The emails were extremely helpful. They were basically the only thing needed to determine when things were taking place and how to sign up for them.

Targeted Emails

We use an Emailer system provided by the Office of the CIO that allows us to send emails to students based on college/department affiliation, class rank, Honors & Scholars affiliation, etc. This system allows us to inform targeted subsets of the student population about specific research opportunities, such as paid internships with OSU faculty. There were 53 faculty requests for assistance recruiting undergraduate student researchers in 2010, and feedback from faculty who use this service is extremely positive.

I am very pleased with the outcome of this mechanism in recruiting an undergraduate student. I have filled the position.

The new ad worked! I've already gotten 10 high quality applicants. Thanks again to helping me with this, I really appreciate it!"

Facebook

In December 2010, we created a Facebook page on the advice of many students, including our Student Advisory Committee. We currently post all of our events to the page, and post status updates to remind students about upcoming events. Currently only 75 Facebook users "Like" the page, but we expect this number to increase quickly. To find the URO on Facebook, search "Undergraduate Research Office at The Ohio State University."

Quarterly Updates to the Faculty

At the start of each Quarter, the URO Director sends an email newsletter to all OSU faculty, via their Deans and Department Chairs, listing recent developments and programs that will be offered by URO. This allows faculty to inform students in their courses about pertinent application deadlines, information sessions, and resources on the URO website.

Academic Advising Association of Ohio State (ACADAOS)

This professional development group for advisors has a listserv that we utilize to reach advisers. Students often report that they hear about events through their academic advisers, most of whom are not faculty members.

Honors & Scholars Net

We post events and opportunities to reach all enrolled Honors & Scholars students on a regular basis.

Office of Diversity and Inclusion

We forward all announcements to minority students on campus through the Office of Diversity and Inclusion.

First Year Experience (FYE)

This office advertises our events to first year students when appropriate.

OTHER PUBLICITY AND MARKETING

BNN (Buckeye Net News)

This weekly newsletter goes out to the entire OSU student population. We use it for general announcements.

OSU Today

We frequently announce events and application deadlines on this digital newsletter, which is read primarily by OSU faculty and staff.

OSU Website/Splash Page

This website reaches the OSU community and beyond. Our events are often announced on this site. We have worked with Kristen Convery, Karen Patterson, and others on stories featuring student research projects from the Denman Forum, with links to the URO website. Some examples from 2010 include:

Learning Environment

Hudson McFann earned his Ohio State degree in June, along with two years of undergraduate research experience. Now, he's in Toronto on a Fulbright Grant.

<http://www.osu.edu/features/2010/fulbright>

What I Did This Summer

Ohio State students answer the perennial back-to-school question: What did you do this summer?

<http://www.osu.edu/features/2010/summerbreak>

The 15th Annual Denman Undergraduate Research Forum

At the Denman Forum, hundreds of undergrads show off research projects across a wide range of fields.

<http://www.osu.edu/features/2010/denman>

Paid advertising

The Lantern

We use an annual spring advertisement to announce the Distinguished Undergraduate Research Mentors. This year, we once again placed an ad about our office in the Freshman Buckeye Bound Edition mailed out to all freshmen.

RPAC Table Tent Mini-posters

These announce highlights of URO programs, and are displayed on a quarterly basis on all tables in the RPAC food courts.

Printed materials

URO Brochure

We print a short brochure on undergraduate research to distribute at events. Copies are mailed to applicants to OSU by the Office of Admissions.

URO Poster

We post a large green poster titled "Why Research?" all over campus, to encourage students to learn more about opportunities at OSU. We also deliver copies of this poster to advising offices around the Columbus and satellite campuses.

Highlights of Undergraduate Research at Ohio State

Each year we publish a booklet of nontechnical research summaries from ~20 selected students who presented their research at the most recent Denman Undergraduate Research Forum. This popular booklet serves as a general introduction to the exciting work that our students are doing as independent researchers. The booklet is distributed to academic leaders and advisors at OSU, is given out to students as appropriate, and is posted to our website.

Journal of Undergraduate Research at Ohio State

See p. 21 for a full description of JURORS' activities in 2010.

Fliers

We post event fliers all over campus at least once each quarter.

Denman Forum Posters and Signage

URO manages the printing and posting of Denman Forum advertisement, in collaboration with the Honors & Scholars Center.

Fall Undergraduate Research Forum Abstract Booklet

These abstracts are printed in an attractive booklet that is distributed at the forum and mailed to key academic leaders, and is also posted on our website.

National Conferences and Publications

This was a very active year in terms of raising our national profile. URO staff gave presentations at three national meetings and Allison Snow published an article in PEER, a publication of the American Association of Colleges and Universities. Allison Snow was elected to a three-year term as a Councilor in the division of Undergraduate Research Program Directors of the Council on Undergraduate Research (CUR). OSU became an institutional member of CUR in 2010. In November, OSU Provost Joseph Alutto gave a presentation on undergraduate research at the annual meeting of the Association of Public Land-Grant Institutions in Dallas, TX.

PUBLICATION

Snow, A. A., J. DeCosmo, and S.M. Shokair. 2010. Low-cost strategies for promoting undergraduate research at research universities. PEER Review, Spring 2010:16-19. American Association of Colleges and Universities. Available on the URO website, <http://undergraduateresearch.osu.edu/kudos/>

PRESENTATIONS

Snow, A. A., J. DeCosmo, S.M. Shokair, and H. Cweren. Low-cost strategies for promoting undergraduate research at research universities. American Association of Colleges and Universities, Washington, DC, January 22, 2010.

Snow, A. A., and H. Cweren. Biennial meeting of the Council on Undergraduate Research, Logan, UT; June 20, 2010.

Title: Encouraging More Student Researchers to Complete a Research Thesis

Abstract: Undergraduate research is not completed until it is communicated to a receptive audience, often in the form of a poster presentation or senior thesis. The goals of this session are to discuss perceived barriers to participation in thesis-writing, how these barriers can be overcome, and the relative value of writing and defending a thesis as compared to presenting a poster.

Blockus, L., and A. A. Snow. Conference on Creativity, Inquiry, and Discovery: Undergraduate Research; American Association of Colleges and Universities, Durham, NC; November 13, 2010.

Title: Ingredients of Undergraduate Research Offices at Doctoral-Granting Institutions

Abstract: Many research-intensive universities have established a campus-wide undergraduate research office (URO) to coordinate undergraduate research opportunities, while others have UROs that focus on specific disciplines. The purpose of this nuts-and-bolts discussion is to examine similarities and differences among representative UROs, allowing participants to consider which components may be most appropriate for their home institution. Topics will include different organizational models, qualifications needed for an undergraduate research program director, and benefits and drawbacks of combining a new position with other responsibilities. This session will focus on low-cost programs and activities that have the greatest impact on undergraduate research. Outcomes will include: discovering areas of convergence and divergence among UROs; facilitating communication networks among colleagues with similar interests; and exploring opportunities for improving the effectiveness of UROs nationally.

The Journal of Undergraduate Research at The Ohio State University (JUROS)

juros.osu.edu

Chief Editor: Olga Borodulin

JUROS Staff

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2010 SUMMARY

Submitted by Olga Borodulin, Chief Editor

JUROS is the student-run *Journal of Undergraduate Research at Ohio State*; it is an online publication which reviews research manuscripts submitted from any area of study in a double-blind peer review process. Following the review process, manuscripts are edited and published at juros.osu.edu. Through extensive collaboration with OSU Libraries, *JUROS* has been able to utilize an open source digital publication system, through which authors may submit manuscripts and reviewers can retrieve and resubmit reviewed articles. *JUROS* also publishes feature articles, videos, and podcasts.

In Spring Quarter, *JUROS* publishes a hard copy edition with highlights from previous online publication. For the Oculus competition, all submitted and online-published manuscripts are judged by a faculty and student review board. *JUROS* published its inaugural Oculus edition in Spring 2010, featuring the 10 best manuscripts from the preceding year. All Spring 2010 Oculus award-winners, as well as numerous feature articles, can be viewed online at juros.osu.edu. For this inaugural print edition, *JUROS* also produced an excerpted print edition, *Oculus In Brief*, which included abstracts of all award-winners alongside several feature articles. To request a copy of *Oculus in Brief*, please email juros@osu.edu.

Major Milestones in 2010

The *JUROS* staff, in conjunction with the Undergraduate Research Office and OSU Libraries, was able to review, format, and publish our **inaugural print edition**. We distributed over 3,400 copies of both the print edition and *Oculus In Brief*.

The 2010 *Oculus Awards* print edition includes 8 feature articles, as well as the following papers:

- Effect of Increased Activity on Metabolic Markers in Captive Black Rhinos: A Pilot Study (Josephine M. Bryk)
- Environmental Effects on the Local Density of States of CdSe Quantum Dots on a Au Substrate (P. R. Stollenwerk)
- Inactivation of *Bacillus coagulans* Spores by Pressure-assisted Thermal Processing (Chelsea Johnson)
- Progressive Collapse Analysis of an Existing Building (Kevin A. Giriunas)
- Neosurreal Interior Design (Laetitia Dupuy)
- Patient Satisfaction Concerning CAM Discussions with Primary Care Providers (Karen To)
- Parent-Child Reading Interactions: A Study of Preschoolers with Language Impairment (Hillary Trapp)
- Gender Performance, Transgression and the Cyborg in *Battlestar Galactica* (Kati McGinnis)
- Disrupting Cause-and-Effect Narratives of Pornography and Violence: A Contextual and Theoretical Case Study of Sexual Violence in Mainstream Media (Jessica Ziegenfuss)
- Bilateral Keyboard Symmetry in the Music of Einojuhani Rautavaara (Brandon Paul)

Online, *JUROS* published 14 feature articles, student commentaries, and faculty interviews. *JUROS* continues to recruit new undergraduate staff, who are currently being trained.

A special thanks from the *JUROS* staff goes to all undergraduate authors and advisors we published, to the staff at the Undergraduate Research Office (including Dr. Allison Snow, Helene Cweren, and Mike Bierschenk), to the OSU Libraries (including Dr. Tschera Connell and Henry Griffy), and to our supportive reader audience, composed of faculty, staff, and students at OSU.

The OSU Beckman Scholars Program in Chemistry, Biochemistry, and Biomedical Science

undergraduateresearch.osu.edu/beckman/

SUMMARY

Coordinator and University Contact Person: Dr. Allison Snow

Funding agency: The Arnold and Mabel Beckman Foundation

Funds received: \$115,800 for six scholars, renewable after three years, plus \$40,000 for two scholars in matching funds from participating departments (\$5K each), the Office of Research (\$15K), and the Office of Undergraduate Education (\$10K)

Duration: August 1, 2009–September 1, 2012

Ohio State was one of nine universities to receive a 2009 grant from the Arnold and Mabel Beckman Foundation. Each Beckman Scholar receives \$16,000 while conducting independent research with a faculty mentor, plus funds for supplies and travel. As stipulated by the Beckman Foundation, these students conduct research and publish papers with one of 13 designated faculty from three academic units: Chemistry, Biochemistry, and Biomedical Science. Beckman Scholars are selected by a Faculty Advisory Committee on the basis of academic credentials, communication skills, maturity, and motivation to pursue science-related careers and professions. Continued support during the scholarship period will require progress towards graduation “with honors research distinction” (honors thesis) and meeting specific benchmarks. We expect the OSU Beckman Scholars Program to produce future leaders and stimulate greater participation in research experiences for students in the STEM fields.

The Beckman Program involves full-time research during two summers and part-time research during the intervening academic year. Enrichment activities include programming for professional development and personal mentoring from faculty, graduate students, and administrative staff. Emphasis is also placed on nurturing leadership qualities and ensuring that Beckman Scholars serve as role models for other student researchers. OSU Beckman Scholars are able to take advantage of far-reaching professional opportunities as part of a tightly connected community of enthusiastic peers and mentors. They present their research results at the Denman Undergraduate Research Forum and the annual Beckman Scholars Research Forum in Irvine, CA.

2010 Beckman Faculty Advisory Committee

Allison Snow URO Director and Chair

Brian Winer Collegium Director

Bruce Biagi, Tatiana Oberyszyn Biomedical Sciences

Donald Dean, Richard Swenson Biochemistry

Christopher Hadad, Karin Musier-Forsyth Chemistry

2010 BECKMAN SCHOLARS



RAJ CHIMANJI

Major: Biology

Faculty Research Advisor: Jill Rafael-Fortney, Department of Molecular and Cellular Biochemistry, School of Biomedical Science, College of Medicine

Project: Identification of new treatment strategies for Duchenne Muscular Dystrophy models exhibiting cardiomyopathy



RANJIT GANGULY

Major: Biology

Faculty Research Advisor: Jill Rafael-Fortney, Department of Molecular and Cellular Biochemistry, School of Biomedical Science, College of Medicine

Project: Defining the molecular mechanism of the skeletal muscle fiber-type switch in a mouse model of Duchenne muscular dystrophy



NICHOLAS JARJOUR

Major: Biomedical Science

Faculty Research Advisor: John Gunn, Department of Virology, Immunology, and Medical Genetics, School of Biomedical Sciences, College of Medicine

Project: Role of LPS modification in regulation of the epithelial cell innate immune response by *Salmonella enterica* serovars Typhimurium and Typhi

2009 BECKMAN SCHOLARS



PHILIP BUNTING

Major: Chemistry

Faculty Research Advisor: Malcolm Chisholm, Department of Chemistry, Division of Natural and Mathematical Sciences, College of Arts and Sciences

Project: A new MM quadruply bonded unit for use as a novel bridging ligand for supramolecular chemistry.

I've been to a few conferences and poster sessions now, but the Beckman Symposium is easily the best one I've been to. It's a small conference (just the Beckman Scholars) but it has speakers and sessions that you would see at larger conferences. And because it is a relatively small group, it's easy to talk to everyone there. . . . I'm planning on going to graduate school for inorganic chemistry (or possibly materials chemistry), then I'll obtain a postdoctoral position. From there I'd like to be a professor at a research university, where I can teach and do my own research.

Presentations:

Bunting, P. B., B. J. Lear, and M. H. Chisholm. A Metal-Metal Quadruple Bond Based Redox Active Analog of 4,4'-Bipyridine. College of NMS Undergraduate Research Forum, Columbus, OH, May 2010.

Bunting, P. B., B. J. Lear, and M. H. Chisholm. A Metal-Metal Quadruple Bond Based Redox Active Analog of 4,4'-Bipyridine. 15th Annual Denman Undergraduate Research Forum, Columbus, OH, May 2010.

Bunting, P. B., B. J. Lear, and M. H. Chisholm. Electronic and Spectroscopic Properties of a Redox Active Analog of 4,4'-Bipyridine Incorporating a Metal-Metal Quadruple Bond. 65th International Symposium on Molecular Spectroscopy, Columbus, OH, June 2010.

Bunting, P. B., B. J. Lear, and M. H. Chisholm. Electronic Communication through a Metal-Metal Quadruple Bond. 12th Annual Beckman Scholars Symposium, Irvine, CA, July 2010.

Bunting, P. B., B. J. Lear, and M. H. Chisholm. Electronic Communication through a Metal-Metal Quadruple Bond. Sigma Xi Annual Meeting & International Research Conference, Raleigh, NC, November 2010.



IAN GREEN

Major: Microbiology
Early admissions program at OSU Medical School

Faculty Research Advisor: Gustavo Leone, Department of Virology, Immunology, and Medical Genetics, School of Biomedical Sciences, College of Medicine

Project: Phenotypic characterization of trophoblast giant cell specific Cre knock-in mouse lines

The Beckman Scholars program is a stellar experience for any undergraduate researcher aspiring to become a leader in his or her field. The mentorship and support are simply invaluable assets contributing toward the growth of the student.

The best part of the experience was by far attending the Beckman Symposium. It was a very motivational and awe inspiring event. The cutting edge research presented by nationally recognized scholars in a wide range of fields really opened my eyes to the direction knowledge is taking. I left with plenty to think about and many topics to read more about upon returning. The experience gave me several ideas of the types of research projects that I would like to pursue as I continue my education

Presentations and awards:

Green, I. Investigation into the Regulation of the Mammalian Endocycle.
College of NMS Undergraduate Research Forum, Columbus, OH, May 2010.

Green, I. Investigation into the Regulation of the Mammalian Endocycle.
15th Annual Denman Undergraduate Research Forum, Columbus, OH, May 2010.

Green, I. Investigation into the Regulation of the Mammalian Endocycle.
12th Annual Beckman Scholars Symposium, Irvine, CA, July 2010.

2010 OSU President's Salute to Undergraduate Achievement Recipient

2010 Arts and Sciences Certificate for Excellence in Scholarship

Phi Kappa Phi

Honors Collegium Member



EMILY WONG

Major: Microbiology

Faculty Research Advisor: Venkat Gopalan, Department of Biochemistry, Division of Natural and Mathematical Sciences, College of Arts and Sciences

Project: Evaluating the promise of *Methanobrevibacter smithii* RNase P as a possible anti-obesity target

I know that it's possible to have an amazing research experience without having the title "Beckman" attached to you somewhere, but being a Beckman Scholar was really unique in all the opportunities it opened. Like the kinds of mentors you get to work with, being able to attend the Beckman Symposium (which was pretty incredible by itself), and the fact that the experience becomes part of what you bring to your next project. Most rewarding though would probably have to be the incredible support we got from OSU—being able to meet Dr. Gopalan and his laboratory, all the guest speakers, the URO and Beckman Steering Committee—everyone has just been so encouraging and inspiring, and it's really been my privilege to meet so many people in that sort of setting.

Presentations and awards:

Wong, E., and V. Gopalan. *Methanobrevibacter smithii* RNase P - a model for archaeal mesophilic type A RNase P and a possible anti-obesity target. 12th Annual Rustbelt RNA Meeting, Mt. Sterling, OH, October 16-17, 2010.

2009 OSU Fall Undergraduate Research Forum: *Methanobrevibacter smithii* RNase P - a model for archaeal mesophilic type A RNase P and a possible anti-obesity target.

2010 OSU Denman Undergraduate Research Forum: *Methanobrevibacter smithii* RNase P - a model for archaeal mesophilic type A RNase P and a possible anti-obesity target. 2nd Place Winner in Biological Sciences.

2010 12th Annual Beckman Scholars Symposium, Irvine, CA, July 2010. *Methanobrevibacter smithii* RNase P - a model for archaeal mesophilic type A RNase P and a possible anti-obesity target.

2010 Pelotonia Undergraduate Research Award for Cancer Research, OSU Medical Center: \$6,000, 2010-11 academic year. *Methanobrevibacter smithii* RNase P - a model for archaeal mesophilic type A RNase P and a possible anti-obesity target.

2010 Sigma Xi Associate Member (elected)

Donors to the Undergraduate Research Office

CASH FUNDS

The Office of Undergraduate Research Fund (Fund 312045)

Proceeds from this fund are used directly for grants and fellowships for students. University employees can request tax-deductible monthly paycheck contributions be made to URO via the Campus Campaign for giving (campuscampaign.osu.edu). One-time contributions can also be made directly via: <https://www.giveto.osu.edu/jgive>. Currently, eight OSU employees are generously contributing to this fund, at a combined rate of \$238 per month (\$2856 per year). We hope to see greater participation in the years ahead.

ENDOWED FUNDS

Karen A. Holbrook Fund (Fund 663339 – current endowment of \$202,817)

This fund was established to honor OSU past-president Karen A. Holbrook. The funds are used to support research through the Undergraduate Research Office and/or Study Abroad Scholarships through Office of International Affairs (OIA). Contributions can be made to this fund via: <https://www.giveto.osu.edu/jgive>.

The current earnings from this fund are enough to support **1-2 summer research fellows each summer** at ~\$3,500. URO funded a student in 2008, but OIA did not expend funds in 2009. Starting in 2010, URO and the OIA will collaborate to fund students who are conducting research projects abroad. Two awards were given in 2010 because no funds were spent in 2009:

Justin Hanson (English, fourth year)

Project Title: Inside The Body Politic: Examining the Transformation of Gay Culture Post-Stonewall
Advisor: Manuel Martinez, English

Viral Patel (Economics, Microbiology, fourth year)

Project Title: The Impact of the Civil Sector on the Effectiveness of India's Rural Employment Guarantee Schemes
Advisor: Irfan Nooruddin, Political Science

Previous recipient: Marc Coons (2008)

The SOLAR Foundation-Undergraduate Research Awards (current endowment of \$50,187)

The SOLAR Foundation Research Fund was established in 2009 by the OSU Board of Trustees with gifts from Dr. Emil Bisaccia (B.S. 1974 – Biology) of the SOLAR Foundation of Morristown, New Jersey.

This endowment fund is used in support of undergraduate student research in the fields of epidemiology, virology, HIV and AIDS education, other infections of the blood, and related subjects, and is administered by the Undergraduate Research Office. Eligibility requires full-time undergraduate student status, a GPA of 3.5 or higher, and supervision by an OSU faculty mentor. The **2010-11 recipients** of the SOLAR Foundation Research Grants (\$500-1,000) are:

Geoffrey Bennett (Molecular Genetics, third year)

Project Title: The Role of Base Excision Repair Proteins During HIV Infection

Advisor: Richard Fishel, Department of Molecular Virology, Immunology, and Medical Genetics (OSU Medical Center)

Andrew Curtright (Microbiology and Pharmaceutical Sciences, fourth year)

Project Title: In vitro selection of RNA aptamers that bind human LysRS Protein

Advisor: Karin Musier-Forsyth, Department of Chemistry

Bradley Lander (Political Science (Public Health minor), third year)

Project Title: The Impact of Educational Initiatives to Increase Minority Enrollment in HIV/AIDS Clinical Trials

Advisor: Robert Baiocchi, Division of Hematology (OSU Medical Center)

Appendix A

Summary of the 2010 Honors Thesis Survey

Conducted by the Undergraduate Research Office

BACKGROUND:

Completing a thesis leads to stronger writing skills, deeper expertise, and a more impressive resume, but most undergraduate researchers do not choose this route. To learn more about their opinions, we sent a Zoomerang survey to 5,447 honors students of all ranks in early June 2010 to ask about plans to complete a thesis. We received 559 responses. Most respondents (91%) were evenly distributed as freshmen, sophomores, or juniors, and 9% were seniors. 63% of respondents reported that they were majoring in Arts & Sciences, 25% were from professional colleges, and 13% reported “other.” Thus, there was a good diversity of responses representing colleges and majors across the university.

RESULTS:

91% of the respondents answered yes to “Could experience with independent research or a major creative project help you with applications for jobs or further training after graduation?” This indicates that students are aware of the connection between research involvement and future achievements.

However, **only 43%** indicated that they had completed or were planning to complete a thesis. (In reality, a lower percent - fewer than 300 students - complete a thesis each year.) Many students do research, but they don't see the need to follow through with a thesis.

The following reasons were given for why students were undecided or not planning to complete an honors thesis (they could choose as many as applied):

- 57% Not sure what is required to complete an honors thesis
- 49% Too busy/Not enough time in my schedule
- 33% Do not need an honors thesis for my post-graduation plans
- 31% Not sure how to complete the paperwork/Other bureaucratic concerns
- 26% Lack a faculty research mentor
- 22% Too challenging/Requires too much work or effort
- 19% Not interested in writing up my research/creative project
- 17% Not interested in working on a research project or other creative project
- 12% Don't want to defend my thesis in front of a faculty committee
- 11% Would delay my graduation

RECOMMENDATIONS FROM STUDENTS:

When asked, “Do you have any suggestions for how OSU can help more students to complete an honors thesis?” 280 students were happy to comment. Overwhelmingly, their message was to **provide more information!** Repeatedly, students wrote that they wanted more direction, better explanations, and clarification about the honors thesis, its steps, requirements, the process, and benefits.

Thus, improving the information available, how and when it is disseminated, as well as facilitating the academic partnership between students, faculty and advisors, are all ways in which to alter these perceptions and increase the number of students completing a research thesis or project.

Appendix B

Undergraduate Research Offices at Benchmark & CIC Universities

Sources: Websites listed in Table 6.

Most large, public research-intensive universities have programs for undergraduate research, often in a decentralized structure. The trend toward having a central office that serves as an informational clearinghouse for the entire student population is becoming more common nationally and is relatively new among CIC institutions (see Table 5). Here we focus on comparing programs among universities, with the caveat that some recent developments may not be included and not all websites had the information we sought.

TEN OSU BENCHMARK UNIVERSITIES

1. **Pennsylvania State University** has a website and an undergraduate research forum. On their website, they advertise summer grants, conference travel grants, and the forum. The website also includes a database of faculty postings for undergraduate research opportunities which can be sorted by college or faculty.
2. The **University of Arizona** has 28 undergraduate research programs in various disciplines, including a Beckman Scholars Program (in biochemistry & chemistry). They have a searchable database of faculty who work with undergraduates. The university has research poster sessions in various disciplines, including the Undergraduate Biology Research Program which has been in existence for 20 years.
3. The **University of California at Los Angeles** has Research Centers for undergraduate research in Life & Physical Sciences or Humanities and Social Sciences. Research Center websites include lists of fellowships and scholarship opportunities, student profiles, and announcements about workshops for getting started in research.
4. The **University of Florida** offers a database of all research opportunities by field as well as programs for 1st and 2nd year students to begin research. Undergraduate research is coordinated through the Honors Program, where students can receive credit and financial aid for research. Florida also has a University Scholars Program for non-Honors students and a Beckman Scholars Program. Students can publish in a campus-wide Journal of Undergraduate Research.
5. The **University of Illinois at Urbana-Champaign** appears to be developing an undergraduate research program. They sponsor an annual research symposium for undergraduates. The Office of the Provost had a committee titled Working Group on Undergraduate Research listed on its website in 2009, but the status of this committee is not clear.
6. The **University of Maryland** has an office devoted to undergraduate research which offers seminars about ethical research practices, applying to graduate school, presenting at conferences, etc., with an online database listing research opportunities. The Maryland Summer Scholars program offers summer research funding. Maryland has an annual Undergraduate Research Day for presenting research.
7. The **University of Michigan** has a well established program for 1st and 2nd year students across disciplines, with a website, staff, alumni organization, and a large, multi-session spring symposium to showcase student research accomplishments, as well as several externally-funded summer programs. Michigan obtained NSF funding to establish and evaluate this highly effective, nationally known

program. After the grant expired, the university has continued its support for this program with more than 1000 students and 600 faculty research mentors. Michigan does not yet have a campus-wide program that focuses on 3rd and 4th year students.

8. The **University of Minnesota** has a central office that sponsors a program is open to all undergraduates (not just 1st and 2nd year students). Students apply and are funded to do research, and there is a campus-wide forum.
9. The **University of Washington** has a well-funded, nationally-known Undergraduate Research Program with a campus-wide office that helps students find research opportunities and sponsors an annual Undergraduate Research Symposium. Their website includes a database of research opportunities, including programs for paid research experiences.
10. The **University of Wisconsin—Madison** supports an Undergraduate Research Scholars Program for 1st and 2nd year students across all disciplines. They sponsor an Undergraduate Symposium for students in all disciplines, with several hundred participants. The forum includes students in the Research Scholar Program, the McNair Scholars Program, Hilldale/Holstrom Fellowship recipients, and the Wisconsin Idea Fellowship recipients.

OTHER UNIVERSITIES (CIC INSTITUTIONS, NOT OSU BENCHMARKS)

Indiana University—Bloomington: The Cox Research Scholars Program selects up to 40 incoming freshmen each year. Recipients of this scholarship commit to year-long research or creative projects, renewable for up to four years. The scholarship has a total value of more than \$60,000 over four years. Other undergraduate research initiatives include the McNair Program for underrepresented groups, the Science Technology and Research Scholars Program, and the Intensive Freshman Learning Experience, which involves six weeks of laboratory research during the summer between high school and college, accelerated freshman science courses, and a \$1,000 scholarship. Indiana has a campus-wide undergraduate research conference.

Iowa State University has a campus-wide Symposium and offers information programs for getting started in research. Iowa has an Undergraduate Research Assistantship for juniors and seniors to receive a stipend as well as summer funding opportunities.

Michigan State University is similar to Ohio State, with a central office, personnel, a website, a large annual forum, and a university-wide approach. Most funding for student researchers is distributed by other units on campus, and small, discipline-specific programs are offered by various colleges and departments.

Purdue University does not appear to have campus-wide research programs for undergraduates. Individual departments have websites for undergraduate research. The University also has a program called Discovery Undergraduate Research Internship, where students can apply for part-time internships during the academic semester and full-time internships during the summer to conduct research in any STEM field.

The **University of Iowa** has a university-wide website, three campus-wide “research festivals,” and a specific contact office and person at the Iowa Center for Research by Undergraduates (ICRU). The office is situated in the Honors Center.

The **University of Nebraska** has summer research programs in various disciplines and sponsors an annual research fair. The University also has the Undergraduate Creative Activities and Research Experiences Program, which is a two-year program for students in any field. Students are funded and receive course credit to assist in a mentor’s project during their first year, and conduct their own project in the second year. Students are required to present their work at the end of the second year.

Table 5. Comparison of undergraduate research offices at benchmark and CIC universities

Institution	Central, university-wide office	Students enroll in a major research program, often with stipend	Focus on 1st and 2nd year students
Iowa State University	No	Yes	No
Indiana University—Bloomington	Yes	Yes	Yes
Michigan State University	Yes	No	No
Ohio State University	Yes	No	No
Pennsylvania State University ¹	No	No	No
Purdue University	No	No	No
University of Arizona ¹	No	No	No
University of California, Los Angeles ¹	Yes	No	No
University of Florida ¹	No	No	No
University of Illinois, Champaign-Urbana ¹	In progress	No	No
University of Iowa	Yes	No	No
University of Maryland ¹	Yes	No	No
University of Michigan ¹	Yes	Yes	Yes
University of Minnesota ¹	Yes	Yes	No
University of Nebraska	No	No	No
University of Washington ¹	Yes	Yes	No
University of Wisconsin—Madison ¹	No	Yes	Yes

¹OSU's benchmark universities as designated by the Office of Academic Affairs.

Table 6. Websites of university-wide undergraduate research programs at benchmark and CIC universities

Institution	Websites
Indiana University	http://coxresearchscholars.iub.edu/
Iowa State University	http://www.undergradresearch.iastate.edu/
Michigan State University	http://www.urca.msu.edu/
Ohio State University	http://undergraduateresearch.osu.edu http://www.denman.osu.edu/
Pennsylvania State University	http://www.undergradresearch.psu.edu/
Purdue University	http://discoverypark.itap.purdue.edu/learningcenter/duri/
University of Arizona	http://ur.arizona.edu/
University of California, Los Angeles	http://www.ugeducation.ucla.edu/ugresearch/ http://www.gdnet.ucla.edu/asis/srp/srpinfo.htm
University of Florida	http://www.honors.ufl.edu/research.html http://www.clas.ufl.edu/jur/
University of Illinois	http://www.provost.illinois.edu/ugresearch/ http://provost.illinois.edu/committees/ugresearch.html
University of Iowa	http://www.uiowa.edu/~icru/
University of Maryland	http://www.ugresearch.umd.edu/
University of Michigan	http://www.lsa.umich.edu/urop/
University of Minnesota	http://www.research.umn.edu/undergraduate/
University of Nebraska	http://www.unl.edu/ous/undergraduate_research/research.shtml http://researchfair.unl.edu/
University of Washington	http://www.washington.edu/research/urp/
University of Wisconsin—Madison	http://www.lssaa.wisc.edu/urs/general/intro.html http://www.learning.wisc.edu/ugsymposium http://www.learning.wisc.edu/

Appendix C

URO Summer Research Fellows

The Undergraduate Research Office offers Summer Undergraduate Research Fellowships for undergraduates who are pursuing research full-time under the supervision of an Ohio State faculty member during Summer Quarter. In 2008, the URO Faculty Advisory Committee selected 13 students; in 2009, we were able to increase our support to 16; and in 2010 we sponsored **17 students** (including two students supported through the Holbrook Fund, and two others funded by the Department of Psychology). Each fellow received a \$3,500 stipend for 10 weeks of work on their respective research projects and participated in the URO's Summer Undergraduate Research Institute. The fellows presented their findings at the annual Fall Research Poster Forum.

The URO wishes to thank the **Office of Undergraduate Education**, the **Office of Research**, the **Department of Psychology**, and donors to the **Karen A. Holbrook Fund** and **URO's Campus Campaign Fund** for supporting this program. Many thanks are also due to the staff in the **Office of Student Financial Aid**, especially Tom Hurley, and to the **Human Resources staff** in the Office of Undergraduate Education, for all of their help in disbursing funds to these and other award winners.

OUR 2010 FELLOWS SAY...

The response from our 2010 Fellows, like those before them, has been overwhelmingly positive. This year's students echoed prior recipients in reporting that a paid fellowship made their research possible:

I collected the great amount of data that I did only because I was a part of the Summer Fellowships Program. [...] I was able to stay in Columbus without having to work at a summer job.
Suzanne Van Horn

Without the scholarship money I would not have been able to work on my research.
Elan Lieber

I had this great proposal for my project and I was excited to get started, but I was unable to stay in Columbus unless I could get paid for being there.
Mackenzie Schumer

For many students, research presented unexpected obstacles, which offered opportunities for growth:

This summer research allowed me to be creative and try new tactics when experiments were failing. [...] I have come to understand that most experiments probably will not work on the first attempt, but the important thing is to be patient and determined.
Suzanne Tabbaa

The biggest lesson I have learned this summer is that research sometimes does not go smoothly, and that perseverance is necessary for success.
Hok Hei Tam

From my experience this summer, I have learned not to give up despite issues with participants, data, resources, or anything else that has been thrown my way — and that might be the most valuable bit of information I have gleaned throughout my work this summer.
Danielle Rickert

I believe that the skills and information I had to learn over the course of the last three months will make the difficulty worthwhile. I've realized that sometimes unforeseen variables and difficulties open the door to unforeseen opportunities.

Lily Liu

Students also found that research affirmed their career goals and prepared them for the future:

Being able to work full-time enabled me to remain focused on my research question. [...] I feel more prepared for the challenges that are in front of me and I am eager to continue my education.

Robert Nichols

My improvement in the field of statistics, thanks to this summer, has been and will be extremely useful throughout the rest of my research career.

Micah Goldfarb

I think this summer's research experience reaffirms my decision to apply to graduate school in physics.

Weishi (Shirley) Li

Going through this process and having this opportunity has increased my desire to participate in research. I hope that someday I can make a career out of it.

Elan Lieber

More than anything, students found that their summer experience gave them a new perspective on their work:

The analytical thinking and research I have been doing about recording and music thus far has made me start thinking analytically about other aspects of music.

Dan White

In conducting research in a foreign setting, I felt I ended each day with a better understanding of my topic, the research process and my place in the world.

Justin Schulze

I always thought that science research was difficult and that humanities research was much easier. By doing humanities research this summer, I have found that it is difficult in its own right.

Alisa Baron

I believe that this summer, I have become a significantly better researcher, because I have come to understand scholarly inquiry in more relevant ways.

Nathan McCullough

Once you start doing something you own and actually take part in the discovery process you cannot imagine how your life was before, with all of those fears and insecurities.

Mackenzie Schumer

Personally, I have begun to understand the enormous strides that researchers and scholars must and do take in pursuit of an academic thesis, hypothesis, or question.

Justin Hanson

This project is becoming more and more of a mystery as time goes by, and that is very exciting. What began as a simple project involving some Raman testing has turned into a remarkably stubborn puzzle.

Ashley Bartman

2010 SUMMER FELLOWS



Alisa Baron

- Major: Spanish
- Research Project: Usefulness of MLU and Spontaneous Production Data in Spanish-Speaking Children
- Advisor: John Grinstead (Spanish and Portuguese)



Ashley Bartman

- Majors: Chemistry, History of Art
- Research Project: The Testing, Analysis, and Conservation of a 1566 Tyndale Bible
- Advisor: Terry Gustafson (Chemistry)



Shirley Li

- Major: Physics
- Research Project: Applications of the Similarity Renormalization Group
- Advisor: Richard Furnstahl (Physics)



Elan Lieber

- Major: Exercise Science
- Research Project: Body Awareness
- Advisor: Carmen Swain (Health & Exercise Science)



Lily Liu

- Major: Biomedical Science
- Research Project: Macrophage Fcγ Receptors in Alloantibody-Dependent Allogeneity
- Advisor: Ginny Bumgardner (Surgery/Transplantation)



Nathan McCullough

- Majors: Sociology, Strategic Communications
- Research Title: Group Dynamics in Online Social Networking
- Advisor: Karen Hutzel (Art Education)



Robert Nichols

- Major: Psychology
- Research Project: Measurement of Predictors of Early Father Involvement
- Advisor: Sarah Schoppe-Sullivan (Human Development and Family Science)



Danielle Rickert

- Major: Psychology
- Research Project: Examining Resting-State Connectivity in Multiple Sclerosis
- Advisor: Ruchika Prakash (Psychology)



Justin Schulze

- Majors: International Studies (Development), Economics
- Research Project: ¿Autodeterminación?: Migration, Identity, and Bilingual Education in Ecuadorean and Bolivian Urban Indigenous Communities
- Advisor: Ulises Juan Zevallos-Aguilar (Spanish & Portuguese)



Mackenzie Schumer

- Major: Neuroscience
- Research Project: A Histologic Characterization of the Rodent Model for Hereditary Spastic Paraplegia
- Research Advisor: Yasushi Kisanuki (Neurology)



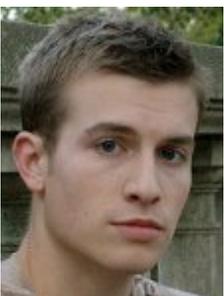
Suzanne Tabbaa

- Major: Biomedical Engineering
- Research Project: Effect of DDR Receptors on Collagen Gel Contraction and Rheology
- Research Advisor: Gunjan Agarwal (Biomedical Engineering and Biophysics)



Hok Hei Tam

- Majors: Chemical Engineering, Mathematics
- Research Project: Zinc Ion Binding to Zinc Finger Proteins Studied by Molecular Dynamics Simulations
- Advisor: Michael E. Paulaitis (Chemical & Biomolecular Engineering)



Dan White

- Majors: Jazz Studies, Music Education
- Research Project: Studio Recording Techniques for Live Instrumental Music
- Advisor: Kenyatta Beasley (Jazz Studies)



Justin Hanson (Holbrook Fellow)

- Major: English
- Research Project: Inside the Body Politic: Examining the Transformation of Gay Culture Post-Stonewall
- Advisor: Manuel Martinez (English)



Viral Patel (Holbrook Fellow)

- Majors: Economics, Microbiology
- Research Project: The Impact of the Civil Sector on the Effectiveness of India's Rural Employment Guarantee Schemes
- Advisor: Irfan Nooruddin (Political Science)



Micah Goldfarb (Psychology-URO Fellow)

- Major: Psychology
- Research Project: The Effect of Construal Levels on System Justification
- Advisor: Kentaro Fujita (Psychology)



Suzanne Van Horn (Psychology-URO Fellow)

- Majors: Psychology, English
- Research Project: Children's Acquisition of Linguistic Register
- Advisor: Laura Wagner (Psychology)

ALUMNI OF THIS PROGRAM

2009 Summer Undergraduate Research Fellows:

Andrew Campbell Biology, International Studies
Jake Connors Physics
Brianna Dance Fine Art, Philosophy
Kevin Gabbard Linguistics
Ravi Gupta Political Science, Molecular Genetics
Carla Justiniano Molecular Genetics
Ellen Manovich History, English
Hudson McFann Geography
Margaret Mehling Psychology
Jessica Modlich Mechanical Engineering
Scott Moreland Physics, Mathematics
Jeremiah Santos Electrical & Computer Engineering
Surili Sheth Political Science, Economics
Adrienne Strong Biomedical Science, French
Gregory Webb English
Kevin Yang Chemical & Biomolecular Engineering, Piano Performance

2008 Summer Undergraduate Research Fellows:

Gina Aloisio Biomedical Sciences, Spanish
Kevin Bowen Accounting
Allison Buenger Fine Arts
Jennifer Chao Biomedical Sciences
Katherine Clonan-Roy Spanish, Psychology
Marc Coons Chemistry
Kevin Giriunas Civil Engineering
John Pate Linguistics
Teresa Pratt Linguistics
Andrew Rigney Political Science, History
Caroline Sim European Studies, English, French
Diane Smith Microbiology, Spanish
Stephen Smith Biomedical Science

Appendix D

Recipients of the Distinguished Undergraduate Research Mentor Awards

2010 Awardees

The URO Student Advisory Committee selected the following winners from 59 nominations by presenters at the 2010 Denman Undergraduate Research Forum. Sample quotes from student nominations are included to illustrate the value of these mentor-student collaborations.

Franco Barchiesi – African-American and African Studies

I identified him immediately as a professor who encouraged his students to think independently and who was genuinely concerned about their well-being. [...] I can honestly say that Dr. Barchiesi has served as the most significant influence on my academic career to date.

Elaine Householder, International Studies '11

Yu-Ping Chin – Earth Sciences

Yu bought me a lab coat and laboratory notebook and told me I was first to learn proper laboratory protocols before I started anything. Yu stressed the importance of lab safety and how documenting every detail of my work is vital to producing publishable results. Yu's system will be forever imprinted in my thought process.

Reece Lonsert, Geology '10

Harvey Graff – English and History

Over the course of three years, he has influenced me more than any other educator at Ohio State; he has helped me become a better research, writer, thinker, and student. [...] It is amazing that a distinguished and busy faculty member would take four years to teach and advise an undergraduate with as much care and attention as Professor Graff has shown.

Ellen Manovich, History and English '10

Becky Mansfield – Geography

Never before, in all my time as a student, have I grown so significantly under the leadership of a teacher or professor: she encourages me to pose new and interesting questions, to ground my research in critical analysis, and to pursue innovative ideas.

Hudson McFann, Geography '10

Mei Zhuang – Aerospace Engineering

Dr. Zhuang has opened my mind and presented me with opportunities that most students never have a chance to see. [She] pushes me more than anyone has in the past and has helped me reach plateaus that are usually not even attained until the graduate level.

Zachary Webster, Aeronautical Engineering '11

2007 AWARDEES

Robert Baiocchi Internal Medicine
Donald Dean Biochemistry
John Grinstead Spanish and
Portuguese
Irfan Nooruddin Political Science
Brian Winer Physics

2008 AWARDEES

Michael Boehm Plant Pathology
Cynthia Clopper Linguistics
Richard Hughes Physics
Sarah Schoppe-Sullivan Human Development
and Family Science
Richard Swenson Biochemistry

2009 AWARDEES

Janet M. Box-Steffensmeier Political Science
David L. Denlinger Entomology
James W. Gregory Aerospace Engineering
Charles Massey, Jr. Art
Narasimham L. Parinandi Medicine

Appendix E

Priorities for Donors to URO

WEBSITE LINK FOR GENERAL DONATIONS TO URO

<http://undergraduateresearch.osu.edu/donate.html>

We have many opportunities for donors to help students succeed, including the suggestions below.

GRANTS AND AWARDS

- **Summer research experience** (10 weeks, full time; coordinate with colleges)
 - \$5000 per student (includes \$1000 for faculty mentor) x 50 students per year = **\$250,000 per year**
 - Possible name: **Donor's Name Summer Research Fellowships**

- **Research and travel grants**
 - \$500 per student x 100 students per year = **\$50,000 per year** to cover research expenses
 - \$1000 per student x 10 students = **\$10,000 per year** for travel to conduct research or present completed research at forums
 - Possible name: **Do Something Great Grants**

- **Introduction to research targeting first- and second-year students**
 - two tracks: library research, or internship within a research group
 - student registers for independent study and receives 3–5 credits
 - mentors (faculty, librarians, other researchers) receive \$500 per student to pay expenses and serve as an incentive
 - \$500 per mentor x 100 students per year = **\$50,000 per year**
 - Possible name: **Early Research Opportunities Program**

- **Mentoring awards for graduate students**
 - \$500 award (advanced Ph.D. candidates only) for supervising an undergraduate student's research project
 - \$500 x 100 per year = **\$50,000 per year**
 - Possible name: **Graduate Student Mentor Awards from URO**

- **Mentoring awards for faculty**
 - Each year, URO will recognize five faculty members with outstanding records of sponsoring undergraduate research.
 - \$1000 x five faculty members = **\$5,000 per year**
 - Possible name: **Donor's Name Award for Outstanding Undergraduate Research Mentor**

OTHER OPTIONS FOR GIVING:

- 1) Support for the **Denman Undergraduate Research Forum** each Spring. Now in its 16th year, this forum serves as a peak academic achievement for more than 500 students per year, as well as a huge celebration involving the entire university community. The forum showcases the very best achievements of our most creative and resourceful students. However, long-term funding from generous current donors, including key corporations and the founders, Mr. and Mrs. Richard Denman, is not guaranteed. With the Honors and Scholars Center, we are actively seeking additional support to be able to continue this tradition of excellence. Total cost: ~ **\$125,000 per year**

- 2) **Summer Undergraduate Research Institute.** This expanded version of our current institute will provide programs and a sense of community for undergraduates doing research on campus during the summer. Funds needed for coordination and events. Funds for fellowships are listed above. **\$25,000 per year; name after donor.**

- 3) **Autumn undergraduate research forum** to be held each year. Building on our current fall forum, this larger event will accommodate students who are unable to participate in the Denman Undergraduate Research Forum in May, especially students who did research during the summer, and will help prevent the Denman Forum from become too large to manage. Funding is needed for facility costs, refreshments, publicity, and awards. **\$80,000 per year**
Possible name: **Donor's Name Fall Forum for Undergraduate Research**

- 4) **Summer Term Humanities Institute.** Support for research collaborations between a faculty member in the humanities (\$7,000) and three undergraduate students (\$4,000 per student). Three groups per summer for ten weeks of collaboration (\$19,000 x 3 = **\$57,000**). **Name after donor.**

- 5) **URO Sponsors Group.** A group of sponsors will provide discretionary funds for building the Undergraduate Research Program, including the objectives listed above.
Participating donors will contribute \$4,000 or more per year per person.
Possible name: **Friends of Undergraduate Research at OSU**
Members will receive newsletters, invitations to URO events, and opportunities to meet student researchers.

- 6) **New staff positions** for two half-time graduate students and four part-time undergraduate students. These staff are needed to help with grant-writing, marketing, and communications. Estimated cost: **\$80,000 per year** (each GRA plus fees is \$35,000; \$2,500 per undergraduate)

- 7) **Permanent office space** to house URO staff and serve as a source of information and counseling for students. (Our current space in Page Hall could become unavailable at any time.) **Name after donor.**

Appendix F Structure of the URO Website

