

2008 REPORT

UNDERGRADUATE RESEARCH OFFICE

OF THE OHIO STATE UNIVERSITY



December 15, 2008

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Quotes from two students in the 2008 Denman Forum about their faculty mentors:

“She inspired me to go further in academia and opened my eyes to a whole new path in life.”

“His trust in me instilled a profound sense of ownership of the project and confidence as a researcher.”

The Undergraduate Research Office (URO)

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

Program Manager: Helene Cweren

Administrative Associate: Suzanne Kruse

Graduate Administrative Associate: Holly Wagner

2008-09 Faculty Advisory Committee

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Susan Hadley, Department of Dance

Linda Harlow, Associate Provost and Director of the Honors & Scholars Center,
Department of French and Italian

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David Tomasko, Director of Honors Collegium, Department of Chemical and
Biomolecular Engineering

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Services and Undergraduate Education, OAA

Martha Garland, Vice Provost and Dean, Enrollment Services and Undergraduate
Education, OAA, and Department of History

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Kathleen Nemer (Human Nutrition and French)

Shikha Prasad (Molecular Genetics)

John Ryu (Biology)

Doug Schaefer (Physics/Math/Anthropology)

2008 Highlights

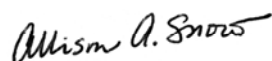
The OSU Undergraduate Research Office (URO) was established in January 2006. Working closely with the Honors and Scholars Center and our undergraduate constituents, the URO has become a central clearinghouse and a voice for undergraduate research at OSU. We strive to open new horizons for interested students in all academic disciplines. One index of student involvement in research is participation in the annual Denman Undergraduate Research Forum - this year's forum attracted a record number of students, 415, which is 17% greater than in 2007. 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.

Major accomplishments of the URO in 2008 include creating the Summer Undergraduate Research Institute (SURI) and funding thirteen Summer Undergraduate Research Fellows, six of whom were supported by the Office of Research. We also expanded our Fall Research Day workshops to include a Poster Forum. Thirty students presented posters on summer research projects to their peers and incoming freshmen. In October, the URO submitted a proposal to the Beckman Foundation to fund undergraduate researchers in chemistry, biochemistry, and biology. Obtaining funds for additional research fellowships is a high priority for our office.

This year we continued to develop and evaluate our year-round programming, as described in this report. Whenever possible, we collaborated with other offices and student groups to publicize opportunities for getting involved in research. With help from Holly Wagner, we expanded our publicity and marketing efforts, and published a booklet of non-technical research stories from the 2008 Denman Forum. Undergraduate Daniel Hannah assisted with rebuilding our website, which includes a vast collection of resources for students and a link for faculty seeking student researchers. Olga Borodulin and her editorial staff made great progress on developing the new undergraduate research journal, JUROS.

The URO is becoming well known nationally. For example, we have heard from colleagues who use information on our website as a model for their programs. This year, Helene Cweren represented the URO at the February 2008 Council on Undergraduate Research (CUR) meeting on "Initiating and Sustaining Undergraduate Research Programs" in Arizona, and I led a workshop on "Starting a Campus-Wide Undergraduate Research Office" at the June 2008 CUR meeting in Minnesota.

As Director of the URO, I greatly appreciate the many contributions of Helene Cweren, Suzanne Kruse, who is our main contact person and event planner, Holly Wagner, and a large crew of extremely enthusiastic students, including Teresa Pratt, Amanda Harper, Olga Borodulin, Andrew Spearman, Steven Smith, and alumni Jessica Hanzlik, Michael Jaung, Joshua Everhart, and Yoonhee Ha. 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.



Allison A. Snow
URO Director and Professor of EEO Biology

Strategic Plan for the OSU 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 Office 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, 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: 50% time Program Director (Professor Allison Snow)
 75% time Program Manager (Helene Cweren)
 Full-time Administrative Associate (Suzanne Kruse)
 50% time Graduate Administrative Assistant (Holly Wagner)

Budget for FY 08/09: \$343,000 for salaries, benefits, supplies, and services.

The Undergraduate Research Office offers year-round programming to facilitate and promote undergraduate research. We have a small staff and much of our work is carried out in collaboration with other academic units, especially the Honors and Scholars Center. Our annual budget supports the costs of four offices 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 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 qualified and interested students (see Appendix G on Priorities for Donors).

Other major sources of annual funding for undergraduate research include >\$600K for honors thesis scholarships (distributed by college committees), \$25K for educational enrichment grants (distributed by the Undergraduate Student Government), summer programs listed in Table 2, and funds from many other decentralized programs. The Denman Undergraduate Research Forum is funded by the Honors and Scholars Center (Office of Enrollment Services and Undergraduate Education), the Office of Development, and the Office of Research, and is organized primarily by the Honors and 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, to further strengthen undergraduate education throughout the Colleges 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 to support undergraduate research activities is provided at a decentralized level by colleges, schools, and departments. Across campus, funding for undergraduate research is insufficient and is not permanent, fluctuating from year to year. In particular, we urgently need funding for summer research opportunities and small budgets for faculty mentors to provide sufficient access for qualified students.

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 senior thesis and graduate "with 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.
- In 2013, we expect to see increases in the numbers of 4th year students in the STEM fields who have participated in research. Progress will be assessed using data from the 2010 and 2013 National Surveys on Student Engagement, as described further 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 EEO Biology, Mathematics, and Statistics (funded at \$980K). In 2008, we also applied for a Beckman Scholars Award to fund undergraduate researchers in the Departments of Chemistry, Biochemistry, and the School of Biomedical Science (\$120K; see summary in Appendix E). 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. Many research projects do not culminate in an honors thesis or a presentation at the Denman 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 if reporting through *OSUpro* is required for faculty members’ annual activity reports (currently, this is only required for promotion and tenure dossiers).

Denman Forum participants – In 2008, participation in the Denman Forum increased by 17% as compared to 2007, to an all-time high of **415 students**. As in 2007, ~70% of the presentations were given by honors students. Many students also gave presentations at research forums sponsored by colleges and departments, such as the College of Biological Sciences, the College of Mathematics and Physical Sciences, the College of Food, Agriculture, and Environmental Sciences, the OSU/CIC Summer Research Opportunities Program for students from underrepresented groups, and the spring research forum at OSU-Newark. These trends in participation at forums are very encouraging.

Honors theses – The numbers of honors students who complete a thesis and graduate “With Distinction” is low relative to the numbers of honors students. In 2007, only **295 students** completed an honors thesis, and in 2008, 274 students completed a thesis. The URO is working with the Honors and Scholars Center, the Colleges of Arts and Sciences, and others to find ways to increase the numbers of students who complete an honors thesis. We are also exploring mechanisms for non-honors students with high GPAs to graduate with research distinction (thesis) and benefit from having this recorded on their academic transcript. Finally, we are examining ways to maximize the effectiveness of scholarships for honors thesis research (>\$600K per year).

Enrollments for research credit – The numbers of students who received credit for honors thesis research (H783 courses) has not changed much during the past six years (Table 1). Students can also get credit for research by enrolling in a new course, 699, which is gradually being added to the curricula of various departments and colleges. The recent and strong increase in numbers of students who enrolled in 699 could represent new interest in research. However, this increase could also be due to a shift from signing up for independent study credits for research (693 and H693) to 699 credits for research. The URO will encourage colleges and departments that have not adopted 699 courses to do so, and this will help us monitor participation in research.

National Survey for Student Engagement (NSSE) – Data from NSSE have the advantage of being drawn from a large, representative sample of 4th year OSU students. However, it is not clear whether the students’ definition of having “**worked on a research project with a faculty member outside of course or program requirements**” is the equivalent of a sustained, independent research project. Our colleagues at national meetings expressed concerns that positive responses to this question might include short-term participation in psychology experiments, for example, and other relatively superficial projects. In any case, this metric did not change substantially between the 2004 and 2007 surveys. Approximately

18-19% of the surveyed OSU students gave a positive response to this question. In 2010 and 2013, we will ask OAA to over-sample students in STEM fields such as biology, math, physical sciences, and engineering so data from these years can be compared (random samples from previous years were not large enough to be used for this purpose).

At one point, we proposed extrapolating from the 18-19% positive responses to estimate the total numbers of graduating students who had done research – at least 1,500 students per graduating class. However, John Ryan, Assistant Provost in OAA, advised against this approach because the survey is not purely random. Thus, we do not recommend using this estimate of participation in research.

Number of students in paid summer research programs at OSU – Table 2 shows the numbers of students in various summer research programs at OSU, with totals of more than **100 students** during each of the past three 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 CIC-SROP students from OSU has declined, other opportunities have increased. Given the large pool of highly qualified and motivated applicants who were denied funding in 2008, we hope to see these numbers increase substantially over the next few years (by increasing extramural funding and contributions from donors). Students who are funded by individual faculty members are not included in Table 2. Based on participation in the Summer Undergraduate Research Institute (Appendix D), we estimate that at least **100 additional student researchers** were supported by individual faculty members and other sources.

Number of NSF REU supplement awards (Research Experiences for Undergraduates) – Principal investigators of NSF grants are eligible to apply for supplements to fund undergraduate researchers. According to Ann Moffatt at OSURF, OSU and NSF do not have databases that can be searched easily to track numbers of supplement awards. She searched for NSF grants to OSU with REU in the title and found 31 supplement grants in FY 04-05, and only **8 supplement grants for FY 06-08**. This is a conservative estimate of the numbers of supplement grants, but she notes that the trend toward fewer of these grants is probably real. URO will work with the Office of Research to encourage more faculty to consider applying for REU supplement grants. During the past three years, 19 OSU students have received summer fellowships from another program, the NSF REU Site Awards to OSU faculty.

Number of OSU faculty using the URO website to find students – More faculty used our targeted email announcements to find undergraduate researchers in 2008 than in 2007 (29 vs. 17), and many of them told us that they had found very good matches. 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 those in the College of Medicine and other large research centers who have little personal contact with undergraduates.

Table 1. Data on Student Participation in Undergraduate Research at OSU.						
	2003	2004	2005	2006	2007	2008
Number of Denman Forum presenters¹	231	276	326	354	354	415
Percent who were honors students	NA	77%	65%	66%	73%	71%
Number of honors theses¹ (summer-spring, starting 02-03)	236	292	276	277	295	274
Number of students enrolled for credit² (total enrolled per year, four quarters; starting 02-03)						
Honors Research (H783)	688	701	711	680	631	660
Research (699; new option)	54	66	119	148	342	687
Subtotal for research	742	767	830	828	973	1347
Independent Study (693)	4877	5453	4553	5478	5484	4706
(College of the Arts 693)	(468)	(851)	(158)	(1205)	(1196)	(1177)
(College of Social & Behavioral Sci. 693)	(1169)	(1056)	(1098)	(1229)	(993)	(673)
Total (H783, 699, 693)	5619	6220	5383	6306	6457	6053
NSSE Question: 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 years						
Percent of 4th year OSU students in random sample answering "yes" (number of responses) ³						
All Students	NA	19.0 (447)	NA	NA	17.5 (861)	NA
Arts and Sciences	NA	19.4 (216)	NA	NA	20.8 (384)	NA
Professional Schools	NA	18.6 (210)	NA	NA	14.4 (400)	NA

¹Source: Linda Harlow, Honors and Scholars Center; Columbus campus data

²Source: Linda Katunich, University Registrar; Columbus campus data

³Source: John Ryan, Office of Academic Affairs; Columbus campus data

Table 2. Summer Research Internships at OSU.

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

Program	2006	2007	2008
CIC Summer Research Opp Program (under-rep. groups)	36	20	11
Summer Honors Thesis Research Internship	18	13	7
URO Summer Undergraduate Research Fellowship	NA	NA	13
Research on Research (TELR)	12	10	9
Bio. Sciences Mayers Internship for Honors Thesis	NA	10	14
Biology - Stone Laboratory REU (not paid positions)	6	6	9
Plant Mol. Biology & Biotechnology SURE	4	4	3
MBI – Mathematical Biosciences Institute – REU	5	4	0
Pharmacy Summer Research Fellowship	5	4	5
Plant Pathology Dept. SRIPP	5	7	5
Biochemistry Summer Undergraduate Research Program	4	4	4
Astronomy Dept. Summer Undergraduate Research Program	~3	6	6
Physics Dept. Summer Research Interns	8	4	7
NSF REU Site - Molecular Genetics & Biochemistry	NA	3	6
NSF REU Site – Chemistry/Biology Interface	NA	1	0
NSF REU Site – Nanotechnology	?	7	2
Dr. Rudy Melfi Research Fellowship in Dentistry	5	2	3
College of Engineering/Engineering Experiment Station	4	2	2
Earth Science - Shell Undergraduate Research Experience	NA	NA	8
Geography	NA	NA	1
Karen Holbrook Fund	NA	NA	1
Dept of EEO Biology	NA	NA	1
OSU Marion Campus	NA	NA	1
Total OSU students	112	107	118

Year-Long Programming for OSU Undergraduates

The URO has developed a full year cycle of programs to encourage and support student participation in research. During the 2007-2008 academic year, we estimate that our workshops, events, and presentations in GEC courses reached approximately **2,500 students**. While each quarter has its own “headline” event and a variety of workshops and panels, some efforts are year round, including:

- Information Sessions (weekly, except during Summer Quarter)
- Research with Human Subjects: Institutional Review Board (IRB) Training for Undergraduate (quarterly, except for Summer)
- Spilling the Beans: The Secrets of Undergraduate Research (student panel discussion; held quarterly except for Summer)
- Individual advising
- Email contact/outreach
- Website updates and announcements

Autumn Quarter

The main program event during the Autumn Quarter is the Fall Undergraduate Research Day and Poster Forum, which is held on a Sunday afternoon in mid-October. In addition viewing posters, students attend the following workshops:

- Spilling the Beans: The Secrets of Undergraduate Research (focus on lab research)
- Spilling the Beans: The Secrets of Undergraduate Research (focus on non-lab research)
- Faculty Perspectives on Undergraduate Research (faculty panel; focus lab research)
- Faculty Perspectives (faculty panel; focus on non-lab research)
- The Ins and Outs of Summer Research (student panel with advice from URO staff)
- Have Research, Will Travel (student panel; research abroad)

The focus of our efforts during the Autumn Quarter is on new students. In addition to the Research Day, our staff and student volunteers participate in the Student Involvement Fair, give presentations in Freshman Survey classes, and host two FYE Success Series Panels. A new program this year was Research Round Tables Dinner, where new students met with experienced students to explore research opportunities in their specific areas of interest. We also co-hosted a faculty panel with the Mershon Center on research in Social and Behavioral Sciences and the Humanities, and we repeated the popular Ins and Outs of Summer Research, hoping to raise awareness of the types of programs at OSU and elsewhere, with special attention on planning ahead and meeting winter deadlines.

Winter Quarter

The “headline” program during Winter Quarter is a URO-sponsored event that is part of the campus-wide ESUE Academic Enrichment Colloquium—this year’s topic is Globalization and Ethics. The URO is organizing a panel and reception focusing on captivating examples of OSU faculty research in Sub-Saharan Africa—what is being done and what is its impact? Last year, we hosted Dr. David Goodstein from California Institute of Technology to speak about Research Ethics.

The focus of other Winter Quarter programs is collaboration with other offices at OSU. In addition to organizing four pre-Denman Forum workshops with the Honors and Scholars Scholars, we have three other co-hosted programs:

- Have Research, Will Travel (with the Office of International Affairs)

- Q&A: Applying for OSU Summer Research Programs (with Honors & Scholars, Digital Union, and Stone Lab)
- Icing on the College Cake: Honors Thesis or Not? (with Honors & Scholars and Arts & Sciences Honors Advising)

Spring Quarter

The highlight of Spring Quarter is the Denman Undergraduate Research Forum, now approaching its 14th year. While Honors & Scholars continues to manage 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. In 2008, we used a new set of posters to encourage more students and faculty to attend the forum. Starting in 2007, we developed the Distinguished Undergraduate Research Mentor Awards to recognize the role of faculty in undergraduate research (see Appendix F for awardees and students' comments).

During the Spring Quarter, URO staff attend several undergraduate research forums that take place on campus. We sometimes offer complementary programming, such as assisting with an undergraduate research panel for the College of Humanities in conjunction with their Spring Colloquium, and speaking and/or offering programming at the OSU Newark Student Research Forum.

Spring Quarter is also used to publicize summer research fellowships with later deadlines. This spring we are tentatively planning a workshop with a library archivist to introduce students to the remarkable resources available here at OSU, and another program with the Digital Union on using multimedia to present research results.

Summer Quarter

After a successful first year, the Summer Undergraduate Research Institute (SURI) will continue to be the focus of Summer Quarter (see Appendix D for details). Undergraduate students in formal, organized programs and those working independently with a mentor can register with the URO attend a large, kickoff dinner and are invited to a variety of social and professional development activities. Weekly brown-bag lunches provide a venue for getting to know each other and discussing progress on research.

Based on comments and survey feedback, as well as data on attendance, future SURI programs will be more oriented toward professional development, including programs on:

- Applying to Graduate School (a student panel)
- Writing a Cover Letter and Resume (with OSU Career Connection)
- Writing Personal Statements (with OSU Career Connection)
- Communicating Research with a Poster Presentation (with OSU Faculty and TA Development)
- Using Multimedia to Present Research Results (with the Digital Union)

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 quarterly, 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, see Appendix B), panel speakers, and volunteers at URO-sponsored events. We host a spring luncheon celebration each year to recognize the many contributions of our students to OSU's undergraduate research program.

Publicity and Marketing

Publicity and marketing are integral to the success of all aspects of the URO. Our website is the main venue where all information is maintained and updated. During the past summer, we began tracking number of “hits” on our website; in November alone we had over 2,200 visits to our website. (During the summer, we also sent out information *via* a blog and a Facebook page with minimal success.) While the website remains central to our communication with students, it obviously requires complementary outreach methods. We use a variety of digital and non-digital methods to stay in touch with students, depending on the target audience and the type of announcement. Attendance at our events has been excellent and occasionally exceeds our seating capacity. At the same time, we are constantly seeking new strategies for reaching a larger portion of the OSU community. Our main venues for publicity and announcements are listed below.

Email listserves

- **Undergraduate Research Office**—(approximately 2300 names) Students can sign up at outreach events such as the Student Involvement Fair, through our website, and when attending URO-sponsored programs. An “unsubscribe” option is offered with each outgoing message.
- **ACADAOS** (Academic Advising Association of Ohio State)—This professional development group for advisers has a listserve that we utilize; students often report that they hear about events through their department advisers.
- **Honors and Scholars Net**—We post events and opportunities to reach all enrolled honors and scholars students.
- **Diversity Services**—We forward all announcements to minority students on campus.
- **FYE** (First Year Experience)— This office helps us advertise to first year students when appropriate.
- **Targeted Emails**—We use an OIT EMailer system that allows us to send emails to students based on college/department affiliation, class rank, honors and 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.

Other digital venues

- **BNN** (Buckeye Net News)—weekly newsletter that goes out to the OSU student population.
- **OSU Today** —newsletter read primarily by OSU faculty and staff.
- **OSU Website/Splash Page** – reaches the OSU community and beyond.
- **URO Website** – reaches the OSU community and beyond.

Paid advertising in OSU venues is not used very often. For large events, we alert editors at The Lantern and On Campus to encourage coverage.

- **The Lantern** – advertisement announcing Distinguished Undergraduate Research Mentors.
- **On Campus** – none.
- **RPAC Table-Tent Mini-posters** - winter and spring; displayed on all tables in the food courts.

Printed materials

- **URO Brochure**
- **URO Poster** – large green poster distributed all over campus and refreshed each quarter.
- **Booklet on Highlights of Undergraduate Research** – mailed annually to ~600 OSU academic leaders and advisors, starting this year, along with our brochure and a letter from the Director.
- **Fliers** (as needed)

Appendix A

Undergraduate Research Offices at Other CIC/Big Ten Universities

Sources: Websites (see list in Table 4), emails, and an October 2008 survey of CIC provosts by Douglas Estry, Associate Provost & Dean of Undergraduate Studies at Michigan State University.

Most large, public research-intensive universities have several programs for undergraduate research, often in a decentralized structure. These are too numerous and varied to summarize here. The trend toward having a central office to serve as a clearinghouse for the entire student population is relatively new among CIC institutions (see Table 3 on next page), although it is fairly common nationally. **Ohio State's** Undergraduate Research Office is similar to that at **Michigan State University**. Both universities have 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. In most respects, the **University of Iowa** also fits this model. Iowa has a university-wide website, a small, campus-wide forum, and a specific contact office and person. However, at Iowa the office and staff are situated in the Honors Center and seem to have other responsibilities in addition to undergraduate research.

Undergraduate research at the **University of Michigan**, **University of Wisconsin-Madison**, and **University of Minnesota** includes programs in which students apply to participate in a defined undergraduate research program. This is often much easier for students than finding a faculty mentor and research project. Also, early involvement in research is known to promote retention of students in under-represented groups. The University of Michigan has a well established program for 1st and 2nd year students, across disciplines, with a well developed website, staff, alumni organization, and multiple symposia to showcase student research accomplishments. The University of Wisconsin-Madison supports a Research Scholars program for 1st and 2nd year students across disciplines and a large research forum (more than 400 participants in 2008), in addition to several other fellowship programs such as the McNair Scholars Program, Hilldale/Holstrom Fellowships and Wisconsin Ideas Fellowships. The **University of Minnesota's** 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. The University of Minnesota has an office for undergraduate research, a coordinator, and part-time graduate assistant. At **Ohio State**, we would like to offer early research experiences for 1st and 2nd year students and more programs for underrepresented groups if sufficient resources or grants can be obtained.

Pennsylvania State University has a website and undergraduate research forum. On their website, they advertise summer grants, conference travel grants, and the forum.

Indiana University, Bloomington, and **Purdue University**, which do not appear to have campus-wide research programs for undergraduates. **Northwestern University** and the **University of Chicago** have some website information related to undergraduate research, but no office, identified staff, or specific program support. The University of Chicago participates in the annual Chicago area undergraduate research symposium (with Loyola, DePaul, Illinois Institute of Technology, University of Illinois at Chicago and Northwestern), while Northwestern has a campus symposium.

The **University of Illinois**, Urbana-Champaign, is developing an undergraduate research program. There is a webpage titled "Working Group on Mentored Undergraduate Research, Scholarship and Creative Experiences." They had an inaugural undergraduate research symposium in 2008. The working group is also charged with recommending how best to institutionalize campus-level coordination of undergraduate research activities, broadly defined.

Table 3. Comparison of Undergraduate Research Offices at CIC Universities.

Institution	Central, university-wide office?	Students enroll in a research program, often with stipend?	Focus on 1st and 2nd year students?
Indiana University	No	No	No
Michigan State University	Yes	No	No
Northwestern University	No	No	No
Ohio State University	Yes	No	No
Pennsylvania State University	No	No	No
Purdue University	No	No	No
University of Chicago	No	No	No
University of Illinois	In progress	No	No
University of Iowa	Yes (in Honors Center)	No	No
University of Michigan	Focus on 1 st and 2 nd year	Yes	Yes
University of Minnesota	Yes	Yes	No
University of Wisconsin-Madison	No	Yes	Yes

Table 4. Websites of University-wide Undergraduate Research Programs at CIC Universities (Committee on Institutional Cooperation).

Institution	Websites
Indiana University	n/a
Michigan State University	http://www.urca.msu.edu/
Northwestern University	n/a
Ohio State University	http://ugresearch.adm.ohio-state.edu http://www.denman.osu.edu/
Pennsylvania State University	http://www.undergradresearch.psu.edu/
Purdue University	n/a
University of Chicago	n/a
University of Illinois	http://provost.illinois.edu/committees/ugresearch.html
University of Iowa	http://www.uiowa.edu/~icru/
University of Michigan	http://www.lsa.umich.edu/urop/
University of Minnesota	http://www.research.umn.edu/undergraduate/
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 B

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

Progress during the 2007-2008 Academic Year (Olga Borodulin, Chief Editor)

- Staff members were appointed to Editorial and Publication positions.
- Editorial Board Student Organization was founded.
- Office space in the Science and Engineering Library was provided by the OSU Libraries.
- Undergraduate reviewers and faculty were recruited to Editorial Board.
- Website was created with updated submission guidelines and author agreement forms.
 - See <http://www.jurosonline.com/index.html>
- Mission Statement and Proposal for Journal Procedures were created and reviewed by several graduate students and faculty.
- First two features stories were published on the website.
- New fliers were posted around campus during spring, summer and fall quarters.
- Invitations to submit articles were sent to undergraduate summer researchers, Arts & Sciences Research Award recipients, and others.
- Contacted students who published honors theses in the OSU Knowledge Bank with invitations to submit to JUROS (within a year of graduation).
- Explored methods for electronic publication (library system of DPubs).
- Reviewers were given initial practice assignments; no real manuscripts submitted yet.
- Staff is teaming up with several other campus organizations to increase cross-sponsorship.

JUROS Staff (Autumn Quarter 2008):

Chief Editor: Olga Borodulin

Section Editors:

Erica Haugtvegt (Science & Technology)

Mark Kotowski (Social Science, Business & Education)

Julie Starzynski (Arts & Humanities)

Features Co-Editors: Claudia Chou, Meredith Whipple

Copy Editors: Maureen McNulty (production), Stefanie Peters (production), Kristin E. Silver

Copyright Manager: Jacob Deppen

Design/Photography Supervisor: Desiree D. Crawl

Production/Design Manager: Stelios Constantinides

Design Staff: Kaitlin Dyer

Photographers: Ashley Bartman

PR Manager: Susan Jahangiri

Student and Faculty Reviewers (not listed here)

Appendix C

2008 URO Summer Research Fellows

During Summer Quarter 2008 the Undergraduate Research Office established the Summer Undergraduate Research Fellowship (SURF). The SURF is dedicated to undergraduates who are pursuing research full-time under the supervision of an Ohio State faculty member during Summer Quarter. The URO Faculty Advisory Committee selected 13 top students from a pool of more than 100 applicants. Each fellow received a \$3,500 stipend for 10 weeks of work on their respective research projects and participated in URO's new Summer Undergraduate Research Institute (~200 students). The fellows presented their findings at the annual Fall Research Day and Poster Forum, which was attended by more than 150 students.

The URO wishes to thank the **Office of Enrollment Services and Undergraduate Education**, the **Office of Research**, and donors to **URO's Campus Campaign Fund** for supporting the SURF program.

Our fellows say...

"Because of this experience, I am more self-sufficient in the lab, to the point that I am currently heading my project myself. Working full-time in a lab has shown me that research is something that I would like to continue all my life."

-Gina Aloisio, Biomedical Sciences and Spanish

"I finally came to terms with my qualms and apprehensions about producing a body of work. Instead of allowing my fears to subvert my efforts, I allowed experimentation and research to guide my work. There were quite a few bumps along the way...but in the end I am extremely happy about the trip I made."

-Allison Buenger, Fine Arts – Ceramics

"My research took different paths than I had expected. I really felt free to conduct the research that I wanted to."

-Katherine Clonan-Roy, Spanish and Psychology. Katherine traveled to Chiapas, Mexico, as part of her summer undergraduate research fellowship.

"My research project has introduced me to a new and exciting aspect of structural engineering. I still have a great deal more to do and learn, but I am already a better engineer because of what I've accomplished so far."

-Kevin Giriunas, Civil Engineering

"I helped design and pilot the experiment. Analyzing the data has taught me much about my interests and my potential future in the field of linguistics."

-Teresa Pratt, Linguistics. Teresa presented her work at the New Ways of Analyzing Variation conference held at Rice University in early November.

"At the beginning of the summer, I started with little more than a cursory knowledge of the Dance of Death and the dance macabre. What I have decided to focus on for my thesis is how the Dance of Death image changes as it transitions from the Middle Ages through the Reformation and into the Early Modern Age."

-Caroline Sim. Caroline plans to spend time in Europe this winter to explore churches and read manuscripts pertaining to the Dance of Death.



Gina Aloisio

- Major: **Biomedical Sciences and Spanish**
- Project: Maternal RB Function is Critical for Fetal Viability
- Advisor: Dr. Gustavo W. Leone, Mol. Virology, Immunology, & Medical Genetics



Kevin Bowen

- Major: **Accounting**
- Project: The Agent's Choice: Budget Mechanisms with Verifiable Cost Signals
- Advisor: Dr. Richard R. Young, Accounting and Management Information Systems



Allison Buenger

- Major: **Fine Arts**
- Project: Exploring Ceramic Surface Treatment to Enhance Artistic Meaning
- Advisor: Dr. Rebecca C. Harvey, Art



Jennifer Chao

- Major: **Biomedical Science**
- Project: Exploring the Role of MicroRNA 122 in Hepatocarcinogenesis Using Conditional Knockout Mice
- Advisor: Dr. Samson T. Jacob, Molecular and Cellular Biochemistry



Katherine Clonan-Roy

- Majors: **Spanish and Psychology**
- Project: Hermanas de Resistencia: An Analysis of Indigenous Women's Socio-Political Activism in Chiapas, Mexico
- Advisor: Dr. Del Sarto, Spanish and Portuguese



Marc Coons

- Major: **Chemistry**
- Project: Kinetics of UV Photodegradation of a DNA Model
- Advisor: Dr. Bern Kohler, Chemistry



Kevin Giriunas

- Major: **Civil Engineering**
- Project: Progressive Collapse Investigation of Building Structures and Multi-Hazard Mitigation
- Advisor: Dr. Halil Sezen, Civil & Environmental Engineering and Geodetic Science



John Pate

- Major: **Linguistics**
- Project: Extending Models of Child Acquisition of Word Segmentation Using Prosody
- Advisor: Dr. Christopher Brew, Computer Science and Engineering, Linguistics



Teresa Pratt

- Major: **Linguistics**
- Project: Perceptual Dialectology of Ohio
- Advisor: Dr. Kathryn Campbell-Kibler, Linguistics



Andrew Rigney

- Major: **Political Science, History**
- Project: The Road Not Taken: Missed Opportunities and Underexpansion in International Relations
- Advisor: Dr. Randall L. Schweller, Political Science



Caroline Sim

- Major: **European Studies, English, French**
- Project: The Dance of Death in England and France
- Advisor: Dr. Christopher F. Highley, English



Diane Smith

- Major: **Microbiology, Spanish**
- Project: The Role of Endocannabinoids AEA and 2-AG on Blocking Breast Cancer Cell Growth and Metastasis
- Advisor: Dr. Ramesh Ganju, Pathology



Stephen Smith

- Major: **Biomedical Sciences**
- Project: Investigation of Glutamate Receptors at the Neuromuscular Junction
- Advisor: Dr. Jill A. Rafael-Fortney, Molecular & Cellular Biochemistry

Appendix D

Creating the OSU 2008 Summer Undergraduate Research Institute (SURI)

Helene Cweren, URO Program Manager

SURI Goals - *Our goals are to provide student researchers with a strong sense of community and purpose by networking, developing professional skills, and having fun during Summer Quarter at Ohio State.*

SURI Website - <http://ugresearch.adm.ohio-state.edu/suri.htm>

A portion of the undergraduate research student population is very active during the summer, which is often the best time for sustained and focused research activity. Therefore, we established a new network to help students get the most out of a summer research experience. The first questions we asked were how to reach these students and how to bring them together as a community? What did they need to enhance their experiences? What kind of services would they require during the summer that were different from those we provide during the rest of the school year? What could the URO do to raise awareness of and among undergraduate researchers during the Summer Quarter? Using our Summer Research Fellows as a focus group and starting point, we created a new program for all undergraduate researchers at OSU.

Reaching Out

The main purpose of SURI was to bring together student researchers from across campus by erecting an umbrella organization for students from formal organized undergraduate research programs, as well as those working independently under the guidance of a mentor. While 90% of these students were from Ohio State, other undergraduates who were conducting research on campus were welcome as well.

We began by compiling information from various summer undergraduate research programs on campus and reaching out to them (see Table 2, p. 9). Seventeen such programs were identified and 13 joined as co-sponsors of the program. Co-sponsors were asked to share their list of summer undergraduate students and email addresses, as well as be linked to our website. Although we invited participation by the CIC-SROP program for underrepresented groups, sponsored the OSU Graduate School, they preferred to manage their program independently of SURI.

Of the **195 students** who joined SURI and received information throughout the summer, about 50% were involved in a formal OSU program. Enlisting other students who were conducting independent research was accomplished in several ways. First, we sent out announcements *via* email lists, Buckeye Net News (an e-newsletter that goes out to all OSU students once a week during the regular school year), and fliers posted throughout campus—in other words, the “normal channels”. This publicity took place during the last few weeks of the spring quarter.

A second recruitment method involved a major kickoff dinner during the first week of Summer Quarter (free food works wonders!). All students involved in research at OSU during the summer were invited to attend this event, which featured a few inspirational speakers followed by sports and games to promote social interactions. An online interest survey was also utilized before and after the kickoff event to gather information from SURI participants and ferret out more student researchers on campus; completing this survey made a student eligible for a gift card giveaway.

Identifying a majority of the student researchers on campus in summer is more challenging than it may appear because these “normal channels” of communication listed above do not exist. There is no student

newspaper, nor any weekly Buckeye News Net; nor do students wander around as many parts of campus where they would notice fliers and posters. With help from Michael Jaung, a recent OSU graduate and previous co-chair of the URO Student Advisory Committee, we used a website, blog, and Facebook page, but these are passive requiring students to seek them out. Having a comprehensive email list is the only means that allowed the URO to market programs and provide information to student researchers directly—the only means to promote the full range of services and activities that make up SURI. Consequently, those students who completed a SURI exit survey (15% response rate) were nearly unanimous in praising their receipt of emails.

“The emails kept me very updated on what was going on and made it easy to RSVP.”

“Email reminders of events were great.”

“Emails saved me, because that was the only thing I checked daily!”

“The emails were nice, that is why I attended most of the events.”

Programming for SURI

Most of the programming we offered to SURI participants was developed after the kickoff event and after we had reviewed the results of the initial survey so as to better reflect what summer researchers wanted. Michael Jaung provided invaluable advice, leadership, and assistance.

Social Events – Several social events, such as an ice-skating night and campus movie nights, were planned prior to the beginning of the summer quarter and advertised on the website and in handouts early on. Also, Michael Jaung researched summer events at OSU and in the Columbus area and posted an extensive list of social, cultural and sports attractions on the SURI blog.

While we expected that the social activities organized by the URO might really be needed during the summertime lull, our experience suggests otherwise. Efforts to organize group outings met with minimal success. Small groups successfully found each other at movies; some met to watch the 4th of July fireworks together; a group formed to play weekly Ultimate Frisbee games; and the URO sponsored a free ice skating night. However, observations and exit surveys confirmed that the social events were the least attended on the summer schedule.

Discussion Groups - Weekly lunches on the Oval were advertised from the moment SURI was launched. The lunches were informal, with students sitting out on the grass, and they provided a time to meet each other and to share research experiences and socialize. Over the 10 week summer quarter, an average of 12 people attended these weekly lunches (the second week of the summer having the largest attendance of 16 people), and over the summer a small core group of students returned almost every week, with a cadre of others stopping by on occasion. While still relatively small in terms of numbers who participated, the lunches provided a significant, regular backbone to the summer schedule.

One of the greatest challenges to summertime programming is free time and scheduling. 83% of SURI participants did research in laboratory sciences. Many labs are not centrally located on campus, and time-consuming procedures often made it difficult for students to take breaks during regular working hours, including lunch times. As one student wrote:

“Due to my work schedule, I was limited on what I could attend. I missed the brown-bag lunches.”

Scheduling programs to suit this large number of lab researchers will be taken into account for future SURI cohorts.

Professional Development – A single professional development program on research ethics was also scheduled and announced prior to the beginning of the summer quarter. However, based on the initial survey response, the URO inserted other professional development programming into the summer

calendar. It is this programming which proved most popular and which will form the basis of future summer offerings. This included workshops on:

- Undergraduate Research and Applying to Graduate/Professional Schools Panel
- Communicating Your Research Using Multimedia
- Writing resumes and Cover Letters
- Writing personal Statements
- Teaching Your Peers: Poster Presentation Basics
- Quiet Rage: The Stanford Prison Experiment Film and Ethics Discussion

The URO partnered with other offices on campus (Faculty and TA Development, the Digital Union, Career Connection, Office of Responsible Research Practices) to provide expertise and present the above professional development workshops, increasing cross-campus cooperation and awareness of undergraduate research on campus.

Moving Forward

SURI provided an important link to establishing a year-round schedule of support for undergraduate research at Ohio State. With the knowledge gained the past summer about how to more effectively help and communicate with summer undergraduate researchers, the URO will be able to improve and expand SURI in the future. SURI proved to be an excellent means for increasing cooperation among offices at OSU and promoting an undergraduate research culture at OSU. We look forward to enhancing this program and promoting more summer opportunities for our students.

Appendix E

Summary of the 2008 Beckman Scholars Proposal from OSU

Coordinator and University Contact Person: Dr. Allison Snow

Application submitted: October 15, 2008

Funds requested: \$120,000 (six scholars), plus \$40,000 (two scholars) in matching funds from participating departments, the Office of Research, and ESUE.

Decision date: February 2009

For information about the Beckman Scholars Program, see: <http://www.beckman-foundation.com/scholars.html>

Summary

Beckman Scholars at the Ohio State University will conduct research and publish papers with members of a distinguished group of 15 faculty from three outstanding academic units – Chemistry, Biochemistry, and Biomedical Science. During the past five years, these well-funded faculty mentors advised 202 undergraduate researchers and published 29 journal articles with 40 undergraduate coauthors. We anticipate even greater accomplishments from the OSU Beckman Scholars, who will be expected to design their own projects and compete for graduate fellowships.

This interdisciplinary program will be coordinated by the campus-wide Undergraduate Research Office, directed by Professor Allison Snow. Matching funds from OSU will support two Scholars during the award cycle, in addition to the six funded by the Foundation. Beckman Scholars will be selected by a Faculty Advisory Committee on the basis of academic credentials, communication skills, maturity, and motivation to pursue science-related careers and professions. The Scholars will tour several laboratories and meet extensively with each research group before selecting a research mentor. Continued support during the scholarship period will require progress towards graduation “With Distinction” (Honors thesis) and meeting specific benchmarks. Enrichment activities will include year-round programming for professional development and personal mentoring from faculty, graduate students, and administrative staff. Emphasis also will be placed on nurturing leadership qualities and ensuring that Beckman Scholars serve as role models for other student researchers.

OSU Beckman Scholars will be able to take advantage of far-reaching professional opportunities as part of a tightly connected community of enthusiastic peers and mentors. We expect the OSU Beckman Scholars Program to produce future leaders and stimulate greater participation in rewarding research experiences for students in the STEM fields.

Appendix F

Recipients of the Distinguished Undergraduate Research Mentor Awards

2007 Awardees - Robert Baiocchi (Internal Medicine), Donald Dean (Biochemistry), John Grinstead (Spanish and Portuguese), Irfan Nooruddin (Political Science), and Brian Winer (Physics). More than 40 student presenters submitted nominations. Winners receive a plaque and wide recognition for their distinguished contributions to undergraduate research.

2008 Awardees – The URO Student Advisory Committee selected the following winners from 41 nominations by presenters at the 2008 Denman Forum. Sample quotes are included to illustrate the value of these mentor-student collaborations.

Dr. Michael Boehm, Plant Pathology; nominated by Robert Beaulieu.

“Dr. Boehm is the most engaging, friendly, and thought-provoking professor I have had at Ohio State. He made research an easily understood and tangible concept. He also made it fun and something that I want to continue with in my career path.”

“He encouraged me to follow my dreams and strive for excellence.”

Dr. Cynthia Clopper, Linguistics, nominated by Terrin Tamati.

“She actively encourages students to become involved in research.”

“She invites students to participate in a weekly discussion group where faculty and students discuss new developments in linguistics and share their own work.”

Dr. Richard Hughes, Physics, nominated by Jessica Hanzlik (Rhodes Scholar).

Jessica appreciated “...his confidence in my ability to conduct research.”

“He provided the right sort of encouragement that made it clear that the frustration I was experiencing was normal, and could even be considered part of the fun of doing research.”

“Dr. Hughes epitomizes what it means to be a Distinguished Undergraduate Research Mentor.”

Dr. Sarah Schoppe-Sullivan, Human Development and Family Science; nominated by Angela Rule and Lauren Coggins.

“I feel prepared for whatever graduate school throws at me, thanks to all the endless effort from Dr. Schoppe-Sullivan.”

Dr. Richard Swenson, Biochemistry; nominated by Matthew Wohlever, Goldwater Scholar.

“He patiently taught me the theory and practice of almost every lab technique I know. Due to his commitment, I quickly became an independent researcher.”

“He was an integral part of my receiving a Goldwater Scholarship and an NSF Graduate Research Fellowship.”

His mentorship “gave me the best start to a career in research that I could possibly ask for.”