



OARS Research News

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September 2009 Edition



Graduate School and Office for the Advancement of Research and Scholarship
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Message from Dr. Bruce Cochran, Dean of the Graduate School, and Associate Provost for Research and Scholarship



As the new academic year begins, we are pleased to bring you a new edition of *OARS Research News*. The summer has been a busy and productive one for all of us as the hard work of Miami faculty members continues to yield recognition and returns. Inside this newsletter, you will find descriptions of some of the highlights, but I want to mention a few notable ones.

First, Dr. Craig Williamson (Zoology and Ohio Eminent Scholar in Ecosystem Ecology), in collaboration with Colleagues at Kent State University, successfully competed for an IGERT grant from the National Science Foundation (NSF). These are considered to be signature programs by the NSF, and Miami's share of the funding will support as many as eight students working in the area of Environmental and Aquatic Resource Sensing.

Second, our faculty members continue to receive highly prestigious individual awards. Carla Pestana (W. E. Smith Professor of History) was awarded a Guggenheim fellowship, and two of our younger faculty members, Janet Burge (Assistant Professor of Computer Science and Software Engineering) and Michael Brudzhinski (Assistant Professor of Geology), have received CAREER awards from the NSF. They join a growing number of CAREER award recipients from Miami, something that reflects

both the extraordinary research capabilities of our younger faculty and their commitment to research as an educational endeavor as well.

Finally, you can read about exciting new developments in undergraduate research at Miami. In our last issue, we recognized the winners of the Miami University Interdisciplinary Technology Development (MUITDC) program. In this issue, you can read more about their project, "Miami Green Diesel." The 2009-10 MUITDC competition has been announced, and we are looking for ways to sustain the program into the future. And in another wonderful intersection of research and teaching, Linda Dixon (The Rinella Center), Michael Kennedy (Chemistry and Biochemistry) and Joyce Fernandes (Zoology), with support from the President, Provost and OARS, are launching the First Year Research Experience (FYRE) Program, further developing the Miami principles of engaged learning and the student as scholar.

As always, it is the dedication and effort of our faculty members that make these and other such accomplishments possible. We at OARS are available to facilitate their efforts in any way that we can. I invite everyone to participate in workshops and other events we have planned for the fall semester, and to let us know how we can best be of assistance in the development of research and scholarship at Miami.

OARS Research News

Highlights on Miami Faculty Research

Dr. Rachael Morgan-Kiss, Assistant Professor, Department of Microbiology

Miami Green Diesel (MGD): Biodiesel Production in Non-temperate Climates



With the global oil supply rapidly declining, alternative liquid fuels from a variety of sources have been the focus of years of debate and research. Much attention has been placed on the production of bio-fuels from, for example, oil-containing plants such as corn and switchgrass. However, there have been many drawbacks pointed out regarding plant-based systems, including enormous land demands for sufficient biomass production and reports that bioethanol from corn and switchgrass produces less energy than they consume. The objective of this multidisciplinary undergraduate project was to test native Ohio algal strains for their candidacy as viable producers of alternative fuels. Undergraduates from five departments developed an integrative project which brought together basic life sciences (growing & testing algal strains), engineering (building a prototype algal runway), finance (projecting business models for the feasibility of mass-scale algal farming), and ethical concerns (bridging the gap between basic research and public awareness). While there are numerous projects and start-ups throughout the US focused on a variety of aspects of producing fuel from algal biomass, the majority of the existing research to date focuses on algal strains which have been cultivated under lab-controlled environments for decades. This project was unique in that it relied on wild native algal strains. The overarching hypothesis was: the use of cold-tolerant algal strains will be superior candidates over typical lab algal strains for biomass and biofuel production in non-temperate climates, such as Ohio. Major deliverables of the project were: (i) testing a cheap prototype algal growth runway for testing a variety of algal strains under variable environmental conditions, (ii) an 8-week experiment which measured growth, physiology and lipid production in cold-tolerant vs. typical lab algal strains under controlled lab (indoor) and outdoor conditions, and (iii) the production of a brochure and a graphic logo for the purposes of engaging and informing the

general public on the benefits of algal-based biofuel alternatives. The outcome of the project was that the native Ohio strain outperformed the lab strain under both indoor and outdoor conditions at the level of growth rate, final biomass production, and lipid content. This project will be the genesis of a larger research endeavor to form an Algal Research Farm which will produce new algal candidates for large-scale biomass and novel opportunities for undergraduate training and education at Miami University. This work has also been expanded to a project involving nutrient remediation of waste water.

Quotes from students:

Patrick Feasel (*Microbiology, team leader*)

“I have no doubt that with the help of the scientific community; the United States will become energy-independent in the coming years.” “..I have experienced first-hand the type of thinking and teamwork that is required to make a vision a reality.”

Ed Rivera (*Engineering*)

“...I’ve come to realize what an amazing opportunity we have to be the focal research center and truly make a difference towards making the vision of alternative energy a reality. This project has been a great challenge and a rewarding experience working with such a diverse student group to develop a functional prototype and creating a vision for years to come.”

Kevin McLaughlin (*Public Administration*)

“... I was stretched personally and intellectually by working on such a natural science-based project.”

Shawn Dorsey (*Finance*)

“...with all the research I had put into the topic of alternative energy in the last few months, I have finally come to realize the major benefits of alternative fuel and more specifically, algal biodiesel.”

Elizabeth Chmela (*Graphic Design*)

“.. the impact of this project has not just been in the knowledge I have acquired, but in the transformation of how I view energy, sustainability, and my personal impact on the environment.”

OARS Research News

Miami Receives an NSF IGERT Award for Aquatic Sensing



In July 2009, Miami University received a five-year NSF Integrated Graduate Education & Research Traineeship (IGERT) grant to support leading Ph.D. students from across the nation in Environmental Aquatic Resource Sensing (EARS). The Principal Investigator on this grant is **Dr. Craig Williamson**, Professor of Zoology.

The concept for this program is simple, the dependence of humans on freshwater is absolute, freshwaters are threatened by many natural and human impacts, and the development and application of advanced sensors is essential to teasing out the mechanisms of how lakes and reservoirs respond to these threats. Miami IGERT students will have the opportunity to work with faculty and students from both Miami University and Kent State in a large, multidisciplinary program.

The intention of NSF's IGERT programs is to "...catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries." The EARS IGERT program accomplishes this through the collaborative efforts of nine faculty from five different science departments, in addition to science and business faculty at Kent State University. The program focuses on immersive student learning in environmental sensing, from a foundation in ecology and environmental science to sensor design and development to creation of sensor networks to analysis of data sets. This sensor training will be accentuated with practical business experiences from Kent State faculty to develop environmental science professionals equipped for positions in academia or

the private/public sector.

The EARS IGERT students will have a choice of an interesting array of research sites ranging from Ohio reservoirs to natural lakes in Pennsylvania to alpine lakes in the western Rocky Mountains. Each of these sites has its advantages in terms of environmental sensing. The Ohio reservoirs have a valuable long-term database and are the focus of an NSF funded Long Term Ecological Research (LTER) project. Their hydrology is well understood and the human footprint is large. Alpine lakes on the other hand have a very small human footprint due to minimal development in the catchment area, but their high elevation, low nutrient levels, and very short ice-free season makes them very sensitive indicators of environmental change, and particularly good sentinels of anthropogenic nitrogen deposition and climate change.

This year Miami's EARS-IGERT will support three Ph.D. students: Kevin Rose, Susanna Scott, and Jeremy Mack. Kent State will also have three first-year students who will gather with Miami and Kent State IGERT faculty at the Lacawac Field Station in Pennsylvania in mid-September to kick off the program.

For more information on the EARS IGERT program see <http://bioweb.biology.kent.edu/igert/Home.html>.

By: **Craig Williamson**, Professor
Department of Zoology, Miami University



OARS Research News

Miami University Granted Two NSF CAREER Awards

Dr. Janet Burge (Assistant Professor, Computer Science and Software Engineering) and **Dr. Michael Brudzinski**, (Assistant Professor, Geology) have each been awarded a prestigious National Science Foundation (NSF) Faculty Early Career Development (CAREER) Grant. The CAREER program is a Foundation-wide activity that offers awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations. The grants are intended to support faculty research, teaching, and outreach over a five year funding period.

Rationale Capture for High-Assurance Systems-

Dr. Janet Burge, Assistant Professor, Computer Science and Software Engineering.



Designing and building any large system, software or hardware, involves making a series of decisions as the project progresses. These decisions can be about the product being built (e.g. what the requirements are, how it is designed) or about the process used to build it (what organizations are to be involved, how the project will be managed, how it will be tested). These decisions, the alternatives considered, and the criteria used when making these choices all comprise the rationale behind the system. Rationale is especially valuable during software development where the life-cycle of large systems can span several years from planning to deployment and where successful systems can, with proper maintenance, be in operation for many years after that. In practice, rationale is rarely captured during design and development. Dr. Burge's work in rationale has concentrated on studying

how rationale can be used to support software maintenance. The research portion of this project will tackle the issue of capturing rationale. The cost and effort required to capture rationale has been the single biggest obstacle to the progress of research in this area. The research supported by the grant will use technologies developed by Dr. Burge to extract design rationale from existing documentation, and structure it into a format that can be used to assist with further design, development, and maintenance. Utilizing information that is already recorded as byproducts of current development processes should minimize the effort needed to capture rationale. Structuring this information into a form that explicitly represents decisions, alternatives, and the arguments for, and against them will make it easier to use the existing rationale to evaluate design decisions and to determine the impact of changing requirements, assumptions, and evaluation criteria on the design.

The teacher-scholar model encourages the integration of research with education. The teaching portion of the project will achieve this goal by investigating how rationale can be used to increase student learning. The Rationale, Creativity, and Critical Thinking project will study the ability of rationale to aid and evaluate student progression to higher levels of cognitive development. The grant will also support development of two courses for Miami's new Software Engineering degree program—Human Computer Interaction and Software Project Management.

The outreach portion of the project, Abilities First Fulfillment, will work with the INTERalliance of Greater Cincinnati (<http://www.interalliance.info/index.php>). The INTERalliance offers IT Careers Camps to spark student interest in IT. During these camps, the students work with Abilities First (<http://www.abilitiesfirst.org>), a local organization that provides services to people with disabilities, to develop an initial design for a system designed to assist people with a particular disability (selected by the students) in a particular age group (also selected by the students) with communication. The Abilities First Fulfillment project will team students from the IT Careers Camps with Miami Capstone students to build prototypes of their designs. More information on Dr. Burge's research and teaching can be found at: <http://www.users.muohio.edu/burgeje>.

OARS Research News

Miami University Granted Two NSF CAREER Awards (Con't)

Implementing Inquiry-Based Approaches in Geoscience Education and Research- Dr. Michael Brudzinski, Assistant Professor, Geology



One of the most important issues in the geosciences is the growing disparity between the workforce needs and students trained in the discipline. Dr. Brudzinski will examine whether inquiry-based approaches to education and research can aid us in this challenge. This project will build on a Top25 course revision project at Miami University that is converting introductory geology courses from lecture-based to inquiry-based. The inquiry-based approach is also a natural one to investigate an exciting new observation that faults on the edges of tectonic plates produce episodic tremor and slip (ETS). This observation represents a previously unrecognized type of geologic deformation that lies between impulsive, damaging earthquakes and slow geologic creeping.

Dr. Brudzinski's research will expand the investigations of ETS behavior by searching for ETS in a global context using newly developed detection algorithms and by investigating the spatial and temporal relationships between tremor, slow slip, earthquakes, and geologic structures through longer-term recording of ETS signals at fortified temporary networks. These

efforts will be critical for better understanding the physics of how faults move and generate hazards. Following the student as a scholar model, the project will also expand the student research experience by offering undergraduate research to a larger set of students including an investigation into what makes a successful research project, and by experimenting with online research discussions both in classes and with collaborating research groups. These efforts will help to identify key areas where we can continue to improve in the integration of teaching and research.

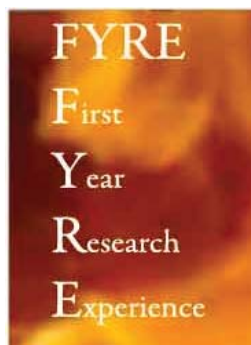
The educational and outreach portion of the project will expand the inquiry-based learning approach to other courses by developing a new workshop to train high school instructors how to use an inquiry-based approach in an advanced placement environmental science class and by developing a second, new course at the college level that focuses on how physical processes associated with plate tectonics relate to geologic hazards. These efforts will be critical to ensure that students are practicing the scientific method not just memorizing the outcomes.

Successfully attracting students to science fields and training them to develop their critical thinking skills will also be critical to the success of our research programs and broader impacts on society. The growing awareness of societal problems caused by natural hazards has piqued the interest of many students who enter our classes, so it is our job to convert that interest into problem solving skills. There is possibly no better example than that for earthquakes, where the threat is ever present, but there are many unanswered questions about how and why earthquakes happen that are in need of well-trained and creative thinking students to push the research to new discoveries.

More information on Dr. Brudzinski's research and teaching can be found on his web pages: <http://www.muohio.edu/geology/people/brudzinski.html>.

OARS Research News

First Year Research Experience (FYRE) Program



New for 2009, the First Year Research Experience (FYRE) program will provide incoming students with opportunities to engage in research and to establish early contact with faculty mentors.

This program results from a two-year involvement of faculty in a Faculty Learning Community that focused on strategies for

recruitment and retention of under-represented student groups in their majors. The FYRE program group leaders are: **Linda Dixon**, Associate Dean of Students, **Michael Kennedy**, Professor – Chemistry and Biochemistry, and **Joyce Fernandes**, Associate Professor – Zoology.

At the start of the fall semester, first year students were invited to investigate the FYRE projects submitted by Miami faculty. Project summaries are available from Miami's undergraduate research website <http://www.muohio.edu/undergradresearch> where interested students can get an idea of possible projects.

First year students can choose one of four tracks. Each track requires students to engage in common seminar/workshop experiences and participate in the Annual Undergraduate Research Forum in mid-April 2010 sponsored by OARS. FYRE program activities address advancing the academic success of students and raising the level of scholarly accomplishments, encouraged by President Hodge with his Student as Scholar learning model.

Program Tracks

(1) **FYRE URO**- Research intensive, all disciplines. (Faculty \$300 award; student employment stipend provided). Faculty participants were asked to submit a project from their own research that a first year student could do with guidance, and are expected to work with their student(s) weekly during the academic year. Each semester, faculty will meet with FYRE administrative

staff as part of the program assessment, complete program evaluations, and participate in a joint meeting. Students are expected to work with a faculty sponsor for 4-8 hours a week. In addition, they will attend weekly/bi-weekly training workshops. This is a year-long commitment. Interested faculty should contact: dixonlj@muohio.edu for additional information.

(2) **FYRE STEM**- This option allows first year students to participate in an ongoing research project. Awards range from \$100-\$200, and will be disbursed to the faculty sponsor. Faculty from Science, Technology, Engineering and Math departments will serve as faculty sponsors.

(3) **FYRE RESEARCH SHADOWING**- This option allows students to experience the research environment without fully participating in an ongoing project. Awards range from \$100-\$200, and will be disbursed to the faculty sponsor.

(4) **FYRE TEAM RESEARCH**- This option allows teams of students to conduct a research project during the academic year. Awards range from \$500-\$1,000. The maximum number of students per team is 6; at least 2 members must be first year students.

How Do Students Get Involved?

Obtain FYRE application forms and information about faculty research projects on the undergraduate research website (<http://www.muohio.edu/undergradresearch>) and visit departments.

Interview at least two faculty members and fill out and submit the application form by Monday, **September 21, 2009** to **Martha Weber** (weberme@muohio.edu) Undergraduate Research Coordinator in the Office for the Advancement of Research and Scholarship, 102 Roudebush Hall.

OARS Research News

Fall 2009 and Spring 2010 Proposal Writing Workshops

The Office for the Advancement of Research and Scholarship (OARS) is sponsoring Proposal Writing Workshops for faculty who are NEW to External Funding.

The workshops will consist of:

1. Hands on, interactive workshop with group meetings, approximately 7-8 times during the semester.
2. The identification of funding sources.
3. The step-by-step proposal development process, to include: writing each part of the proposal with on-going peer review by the workshop participants.

4. Building a proposal budget.

5. Learning about research compliance issues and the Miami internal approval and submission process.

Participants who complete the workshop and then submit a proposal to an external funding agency, will receive \$500 towards operating expenses.

The meeting day(s) and time(s) will be selected based on participant availability. To Sign up to participate in one of the workshops, contact **Anne Schauer** (schauerap@muohio.edu) at 529-3735.

The Art of Funding: Grant Writing for the Arts

On **September 25, 2009**, representatives from the National Endowment for the Arts, and the Ohio Arts Council will present a workshop on the Art of Funding: Grant Writing for the Arts.

The workshops will take place at the Miami

University Art Museum (Oxford) from 9 am to 2 pm and lunch is included. To register, go to: <http://www.muohio.edu/oars> and click on the link for the workshop. If you have any questions, contact Tricia Callahan at 529-1795 or tricia.callahan@muohio.edu.

OARS Workshop- After the Award

Now that you have your grant money, how do you access it? This workshop, offers an overview of Miami's payroll, purchasing, and accounting procedures, including: how to pay people, how to order supplies, how to access funds when traveling. We'll also answer questions such as: What is a chart of accounts? What is Banner and how do I use it? Are ending dates really important? How do I get a no-cost extension to finish my project? If you are a new project director or principal investigator, this workshop is for you. (Co-hosted by the Office for the Advancement of Research and Scholarship and Grants & Contracts Accounting).

Date/Time: **October 2, 2009**, 2:00- 4:00 pm.

Admission: Miami Faculty and Staff; Free

Location: Gaskill Hall 201, Oxford Campus

Presented By: OARS and Grants & Contracts

Contact: **Tricia Callahan**, OARS, 529-1795

Register at: <http://www.units.muohio.edu/oars/>

Locating Grant Funding Opportunities

The Office for the Advancement of Research and Scholarship (OARS) will host a workshop for faculty and staff on strategies for locating grant opportunities using the internet. The hands-on workshop will take place on **October 7, 2009** from 2-4:30 pm. and be repeated on **October 8, 2009** from 2-4:30 pm. in the computer lab located at 201 Gaskill Hall.

Space is limited, so if you plan on attending one of the sessions, please contact **Helen Kiss**, Assistant Director & Information Coordinator, (kisshg@muohio.edu) at 529-3600 to make your reservation.

OARS Research News

NIH Recovery Act (ARRA) Funding for Ohio

Program	Total for State
Child Support Enforcement Program	\$1,342,952
Medicaid Disproportionate Share Hospitals (DSH) Allotments	\$9,987,296
AoA ARRA Funding Distribution for Nutrition Services to States	\$3,734,651
State Adoption Assistance and Foster Care Funding Table	\$8,006,279
State/Territories Medicaid and Territories Prescription Drug Program Funding	\$1,228,942,631
Increased Demand for Community Health Care Services (IDS) Grants by States	\$8,036,510
American Recovery and Reinvestment Act, Section 317 Immunization Funding	\$7,500,366
FY 2009 Child Care and Development Fund American Recovery and Reinvestment Act (ARRA) State and Territory Allocations	\$68,140,840
Recovery Funding for Community Services Block Grant	\$38,976,102
New Access Points Community Health Care Services Grants by State/Territory	\$6,362,316
HRSA Recovery CIP Announcement	\$21,283,725
Ohio Total	\$1,402,313,668
<i>For more information, go to:</i>	http://transparency.cit.nih.gov/RecoveryGrants/grantstate.cfm?state=OH



The Funding Corner

Welcome to new and continuing Miami Faculty and Staff to a new semester. As the summer comes to an end and Fall begins, faculty and staff may want to see me to discuss their current research and scholarship projects so that we can update the grant funding information that is sent to them. As the information will be coming to you electronically, it would be best if we work together at your office computer. All you need to do is send an e-mail to me (kisshg@muohio.edu) or call at 529-3600 to set up an appointment. Together we will discuss the type of funding for which you are looking. For

example you may be interested in curriculum development, travel, research supplies, scholarships, and/or equipment, just to name a few items. We will also explore the OARS Website, which has detailed information on how to go about applying for an external grant, and how we can assist you in the process. There are other professional funding Websites that you may not be aware you have access to locate funding opportunities. Many of these sites provide electronic funding alerts directly to your e-mail address after you have selected key words or terms fitting your research and scholarship needs. We can show you these sites and assist you in signing up for funding alerts that fit your interests. **Helen G. Kiss, Assistant Director, & Information Coordinator, 529-3600.**