

INTERDISCIPLINARY INITIATIVES BULLETIN

Office of Academic Affairs

SPRING 2015



Inside this newsletter:

Welcome	1	Introduction to the Science of Mitigation and Adaptation	3
Modeling & Simulation at ODU: An Interdisciplinary Exemplar	2	Community Resilience and Gaming as Themes for New Interdisciplinary Programs	4
Interdisciplinary Studies Undergraduate Programs at ODU	2	ODU Plays: Gaming Hub	4
ODU Develops New Programs in Cyber Security	3	Art + Science = Inspiration in the ODU Classroom	5
		FAQs from NSF about Interdisciplinary Research Funding	6

Welcome

First among Old Dominion University's strategic goals for the next five years is to enhance academic and research excellence. ODU aims to enhance academic excellence by expanding curricula to include innovative, transformative and flexible offerings in response to student and employer demand for programs that are relevant to the region's and nation's needs (ODU Strategic Plan 2014-2019). To enhance research excellence, ODU's objective is to ensure that interdisciplinary and collaborative work is recognized, and that it is acknowledged as important in faculty tenure and promotion decisions.

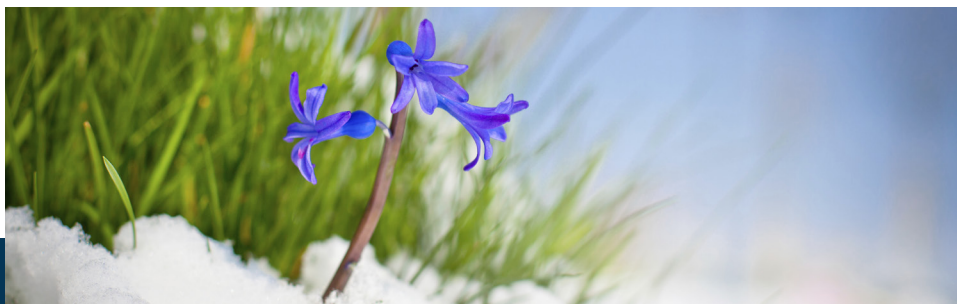
Allow me to offer three definitions to introduce the concepts of "interdisciplinary," "multidisciplinary," and "transdisciplinary" (see right). Although these terms are used interchangeably, each has a unique focus on the connections between and among disciplines. All three represent increasingly common approaches to understanding complex problems.

From local sea level rise to world food security, ODU's commitment to addressing the region's and the world's pressing challenges is exemplified by two words: **"Idea Fusion."** ODU facilitates multi-, inter-, and transdisciplinary collaboration through the synthesis of teaching, entrepreneurship, research and community engagement.

I am pleased to present this inaugural, Interdisciplinary Initiatives bulletin from Academic Affairs to highlight just a few of the many existing and emerging multi- and interdisciplinary programs and research at ODU.

Liz Smith

Interdisciplinary Initiatives Administrator



Interdisciplinarity

A cognitive process by which individuals or groups draw on disciplinary perspectives and integrate their insights to advance their understanding of a complex problem with the goal of applying the understanding to a real-world problem.

Multidisciplinary

Placing side by side the insights from two or more disciplines without attempting to integrate them.

Transdisciplinarity

Involves academic researchers from different, unrelated disciplines as well as non-academic participants (i.e., stakeholders or users) to create new knowledge.

These definitions were taken from, "Introduction to Interdisciplinary Studies" by Allen F. Repko



Modeling & Simulation at ODU: An Interdisciplinary Exemplar

Modeling & Simulation (M&S) is a way of representing and understanding the world around us. It is a unique and powerful way of looking at problems and finding solutions. Old Dominion University is a world leader in M&S **due to a number of accomplishments:** creating the first M&S degree programs in the nation; establishing the Virginia Modeling, Analysis and Simulation Center (VMASC) in 1997; and facilitating a university-wide, interdisciplinary M&S movement. The creation of a Modeling, Simulation, and Visualization Engineering (MSVE) Department within the Batten College of Engineering and Technology in 2009 was a strategic move to establish ODU as a leader in M&S research and education. ODU's interdisciplinary approach to M&S programs has been rewarded in the past two decades by increasing interest in M&S research among the ODU community as well as by attracting high-quality students and faculty by offering a myriad of M&S degrees, concentrations, certificates and courses across all colleges of the university. Faculty from every academic college use M&S approaches to address society's challenges.

ODU, through the Department of MSVE, is a leader in M&S academic programs, offering an undergraduate degree program, a minor in M&S, and four programs of graduate study leading to the following M&S degrees:

- Master of Engineering
- Master of Science
- Doctor of Engineering
- Doctor of Philosophy (first in the nation in 2000)

In addition, ODU offers the following M&S graduate certificates:

- Business and Public Administration
- Education and Training
- Engineering
- Health Sciences
- Human Factors
- International Studies
- Mathematics
- Statistics

Learn more about M&S academic programs: <http://odu.edu/academics/programs/multidisciplinary/modsim>

In July 2014, ODU's Department of MSVE unveiled a new, cutting-edge certificate in M&S developed for the Navy personnel in support of NAVAIR University's College of Test and Evaluation's new School of Modeling and Simulation in Maryland. Twenty students are taking part in the program's four courses to complete graduate level certification, with continuing master's degree work available through ODU's Department of MSVE. Those involved in the partnership are already looking toward expanding the M&S certificate program within the Navy and the Department of Defense.

VMASC is one of the few modeling and simulation research centers in the world to focus on truly multidisciplinary approaches in the discipline of M&S. Scientists from almost every domain, from social and political science to biology and chemistry, use M&S to gain insights, test new methods or to confirm existing theories. VMASC is at the nexus of innovations in transportation, homeland security and military defense, virtual environments, social sciences, medicine and health care, game-based learning and systems science. More information related to the cutting-edge research in M&S being pursued at VMASC is available at http://www.vmasc.odu.edu/downloads/2013VMASC_ResearchReport.pdf.

Interdisciplinary Studies Undergraduate Programs at ODU

The Interdisciplinary Studies program in the College of Arts and Letters was established in 1986, and offers a Bachelor of Science and a Bachelor of Arts with the following concentrations:

1. Individualized Interdisciplinary Studies (BA and BS)
2. Teacher Preparation (BS)
3. Professional Writing (BS)
4. Work and Professional Studies (BS)

In particular, the Individualized Interdisciplinary Studies program makes possible the pursuit of a wide variety of interests in areas such as medieval and Renaissance studies, advertising, legal studies, ecological studies, public relations, management of technical services, photo journalism, and health care administration. Students combine courses from three or more disciplines to satisfy these requirements. More information about the Interdisciplinary Studies program and points of contact, is available at <http://catalog.odu.edu/undergraduate/collegeofartsletters/interdisciplinarystudies/>

ODU Developing New Programs in Cybersecurity

According to the recent report from the Ponemon Institute, an organization that conducts independent research on privacy, data protection and information security policy, the U.S. ranked as the country with the highest average cost of cyber crime at \$12.7 million in 2014 (Ponemon Institute Research Report, October 2014). Not surprisingly, there is a serious need in the U.S., and indeed internationally, for skilled network security professionals. The Bureau of Labor Statistics notes that network systems and information security professionals can expect job opportunities to grow by 53% through 2018.

ODU is responding to this high-need profession currently by offering two certificate programs:

1. The Computer Science Department offers an online graduate certificate in cybersecurity.
2. The Batten College of Engineering offers an Advanced Engineering Certificate at the graduate level in "Cyber Systems Security."

But student demand from a myriad of disciplines, including business

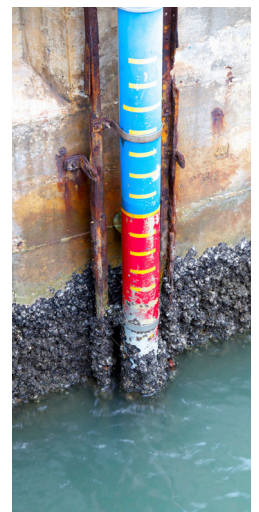
and criminal justice, has been high for courses like cybersecurity fundamentals, information assurance and network systems security. Thus, a cybersecurity task force including faculty and staff from five colleges, eight academic departments and three administrative units have proposed two new interdisciplinary programs to serve existing students and attract new students. If approved, in fall 2015, students will be able to choose an interdisciplinary minor in cybersecurity by selecting 12 credits from an array of courses in computer science, engineering, criminal justice, philosophy and business. In addition, work has begun to establish a new undergraduate concentration in cybersecurity within the existing Interdisciplinary Studies Bachelor of Science degree. In concert with this proposal, ODU submitted an application to the National Security Agency to be designated as a Center of Academic Excellence in Cyber Operations. The aim of such a program is to answer the call of the region's military and business leaders for a new generation of specialists to protect public and private computer and information systems.



Introduction to the Science of Mitigation and Adaptation

In spring 2014, ODU established the Mitigation and Adaptation Research Institute (MARI) to ensure that thriving coastal communities are maintained in and around Hampton Roads. To accomplish this, MARI will facilitate community collaboration to engage in the emerging field of adaptation science. Adaptation science involves providing the practice-relevant knowledge needed by communities to cope with the challenges and to seize the opportunities brought through climate change and sea level rise.

Hampton Roads is a natural laboratory for MARI's efforts. Because of the high rate of local sea level rise due to climate change and the exposure of communities to extreme weather, Hampton Roads communities are increasingly vulnerable. This is of particular concern to local and state governments, along with maritime and military personnel in the area. MARI works with stakeholders to co-create the knowledge and wisdom required to reduce negative impacts of present and future changes to enhance resilience and create thriving communities.



For more information and to get involved with MARI please contact the Director, Dr. Hans-Peter Plag (hpplag@odu.edu) and visit the MARI website here: <http://www.mari.odu.edu/>

Community Resilience and Gaming as Themes for New Interdisciplinary Programs

An important component of the mission of Old Dominion University is to provide practical solutions to complex and real-world problems. A particular challenge in Hampton Roads is to build the capacity of our society to be resilient in the face of disruptions, disasters, and most urgently, climate change and sea level rise. To accomplish this, we must understand myriad important themes: What are the hazards and risks we face; how do we prepare for disasters; what plans can be made to withstand the disruptions disasters may cause; what strategies might sustain social trust, economic viability, and other functions under adverse conditions; how do we manage people and conditions effectively during a crisis; what can be done to recover quickly and effectively; and what adaptations are available to adjust to conditions that have changed as a result of the event.

This is just one example of the many complex challenges faced by modern society today; challenges that do not fall neatly within just one discipline (Stone et al., 2009). Understanding these “grand challenges” or “wicked problems,” those that are foundational and transformative, will require the integration and application of knowledge and wisdom from multiple fields. To address these dynamic and complex problems effectively, educational programs must transcend disciplinary boundaries. Further, students need a multitude of higher-order skills and proficiencies to transform knowledge into wisdom for decision making. In particular, graduate students will have to become proficient in the integrative research process, interdisciplinary research strategies, complex problem solving and collaborative ways of thinking if they are to become accomplished interdisciplinary thinkers, communicators and practitioners.

This is the rationale for expanding interdisciplinary academic offerings at ODU.

Old Dominion University will benefit directly through creation and ownership of programs in fulfillment of its mission to respond quickly and decisively to community needs, and with the capability of attracting highly qualified PhD students among traditional and non-traditional (i.e., retired military officers preparing for a second career) populations. The University will benefit indirectly by strengthening its reputation as a leader in interdisciplinary education and research.

Who will hire these graduates?

Graduates with interdisciplinary training will provide societal leadership with skills in communicating across traditional disciplines and sectors to solve complex societal and scientific problems. For instance, the Rockefeller Foundation is pioneering a program called the “100 Resilient Cities Challenge (100RC)” through which it is providing funding for selected cities to hire a chief resilience officer. A

recent 100RC resilience officer job description for Boulder, Colo., requires the successful candidate to create a resilience strategy to include finance, technology, infrastructure, land use, building and design energy, communications, and community and social issues. The edge will go to candidates who have training and experience solving problems, working collaboratively, and communicating across municipal sectors.

ODU Plays: Gaming Hub

Founded by a number of faculty across five colleges at ODU, the Gaming Hub represents an interdisciplinary effort to leverage student and faculty interest in gaming to produce real-world solutions to public, private and institutional



problems. Melding ODU’s strategic embrace of community engagement, economic development and entrepreneurialism, the Hub will develop and distribute game prototypes that address the pressing needs of public, private and nonprofit organizations. It will license these templates to other private and public entities for a fee along with consultation and customization services. The profits from these licenses and services will then be used to fund and expand the Gaming Hub at ODU. The Gaming Hub thus represents an innovative, low-cost approach to starting a game studies program at ODU. Taking advantage of existing student and faculty interest in gaming, it is constructed around a social entrepreneurial model, one that leverages the potential of problem-based, experiential approaches to education to provide students with practical experience with the types of skills and collaborations that are required to construct digital games.

For its pilot project, the Gaming Hub is partnering with the city of Norfolk to produce a Cannonball Trail mobile game app. Located in downtown Norfolk, the Cannonball Trail is a self-guided walking trail that consists of a number of historical and architectural sites that span the city’s nearly 400-year history. Through augmented reality, the Cannonball Trail app will teach users – primarily tourists, but also K-12 students – about downtown Norfolk’s cultural geography and history, while transforming current obstacles into play-based challenges, incentivizing problem-and-puzzle solving, and providing narrative coherence to the trail’s many landmarks. In doing so, the Cannonball Trail mobile app seeks to leverage student and faculty interest in gaming at ODU to produce a tangible product that will transform the way that people relate to the complex cultures and histories that intersect in downtown Norfolk.

Contact Avi Santo or Kevin Moberly for more information about the Gaming Hub.

Art + Science = Inspiration in the ODU Classroom

When specialists from diverse fields work together to combine their skills and resources, they often produce a synergistic effect. This synergy is exemplified by the following interdisciplinary courses to be offered at ODU.

o **Science in Literature: Reflections on the Social Constructs of Science in Society (OEAS/ENMA795/895)**

Cross-listed in Ocean, Earth and Atmospheric Sciences and Engineering Management, Science in Literature is being taught this semester by Hans-Peter Plag, Michelle Covi (OEAS and MARI) and Michelle Heart (English). Students have the opportunity to critically examine examples from environmental literature to develop skills in the understanding of scientific discourse. How is scientific knowledge used in public media, by politicians and by society? How is scientific reasoning used in science fiction and in the emerging genre called climate fiction?

o **Acting for Scientists/Acting for Professionals (OEAS695/COMM695)**



Do you suffer from stage fright? Have you been advised to speak louder? Stop pacing? Slow down? Stand up straighter? Be more confident? Do these technical tasks border on the impossible, especially when you are most concerned with communicating your professional message?

Jenifer Alonzo (Department of Communication and Theatre Arts) and Fred Dobbs (Department of Ocean, Earth and Atmospheric Sciences) want to help

early-career academics improve their presentation and communication skills. They are motivated by the concern, one voiced by others as well, that the public communication of information has suffered as researchers have focused more intently on their sub-disciplines. Furthermore, given the modern, integrative approach to problem solving, researchers sometimes must collaborate with colleagues far outside their own disciplines. The need to communicate more effectively with the public and with other professionals implies a demand for better training in the area of public presentation.

To that end, Alonzo and Dobbs are teaching a cross-listed course in spring 2015, Acting for Scientists (OEAS 695) and Acting for Professionals (COMM 695). The upcoming semester-long course is an outgrowth of their interdisciplinary pilot project begun last summer and funded by ODU's Office of Research.



The actor-scientist team held a weekly workshop for participants and introduced them to techniques used by actors to relax and focus in preparation for their work on stage.

o **Musicians' Health: Music and Medicine**

Through a partnership with Sentara Music and Medicine Center and interdisciplinary cooperation with several ODU departments, the Musicians' Health: Music and Medicine 3-credit course will be offered in spring 2015. This course will feature discussion on topics vital for a lifetime of healthy musicianship including noise-induced and music-induced hearing loss as well as neuromusculoskeletal and vocal health. The course will be co-taught by music professors Douglas Owens and James Kosnik, with several guest lectures by the Sentara Music and Medicine Center staff and other ODU faculty.



o **Scientists and Poets OEAS 695 (offered in spring 2013)**

"This course will offer insight into scientific thinking and poetic inspiration. Students will read and discuss poetry written by poets and scientists. ... This course will be dangerous; there will be exercises in reading poems aloud and even (gulp!) writing poems. You should not enroll if you are prone to heart palpitations or enjoy cocktail parties at which you have nothing to say." Such was the journey enjoyed by 10 oceanography graduate students in spring 2013 when they took this 1-credit course offered by Jan Smith, the chief departmental advisor and lecturer in English, and Fred Dobbs, a professor in the Department of Ocean, Earth and Atmospheric Sciences. Students learned about the different types of poetry, met published poets, and yes, wrote poetry. In fact, at the end of the class they had produced a 35-page "Book of Unlicensed Poetry."

Please let me know if we can feature your interdisciplinary course in a future bulletin exsmith@odu.edu.



FAQs from NSF about Interdisciplinary Research Funding:

(http://www.nsf.gov/od/iaa/additional_resources/interdisciplinary_research/support.jsp)

1. What is interdisciplinary research?

There is a large body of scholarly literature about what constitutes a “discipline” and the meaning of interdisciplinary, multidisciplinary and trans-disciplinary research. For the purposes of this site, we are using the National Academies’ definition:

Interdisciplinary research is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice.

2. Does an interdisciplinary proposal have to be transformative?

No. The extent to which a proposed activity explores potentially transformative concepts is just one of the considerations included in the Intellectual Merit Review criterion (see the NSF Proposal and Award Policies and Procedures Guide; http://www.nsf.gov/pubs/policydocs/pappguide/nsf09_1/gpg_3.jsp#IIIA).

3. Will interdisciplinary proposals be given preference when funding recommendations are made? How much weight is given in the funding decision as to whether a proposal is interdisciplinary?

If the proposal is reviewed through an existing NSF program, this depends on the criteria of that program. Some programs are specifically restricted to interdisciplinary research topics; in those programs, a great deal of weight is given to “interdisciplinary” aspects. Some other NSF programs, while not so restricted, explicitly encourage interdisciplinary research and consider it as a positive factor. In programs that do not distinguish interdisciplinary research as a priority, positive review of the proposal will be

based on the combined assessment of the project according to the NSF merit review criteria as per the NSF Grant Proposal Guide (GPG), and any other special criteria that may be part of the specific Program Solicitation or Program Description. In such programs, interdisciplinary proposals that advance the program goals are encouraged and funded, and any ‘weight’ is based on the anticipated potential of the project, not whether it is interdisciplinary or single-disciplinary in nature. If the proposal is not reviewed through an existing program, it will be reviewed using only the two NSF Merit Review Criteria: Intellectual Merit and Broader Impacts (that is, there are no additional program-specific criteria to apply).

4. Has NSF set aside funds for interdisciplinary research proposals?

Collaborations of interdisciplinary teams are encouraged throughout many NSF solicitations. For example, facility and center programs may call for interdisciplinary efforts. In programs that do not have an explicit call for interdisciplinary research, funds are not set aside for these proposals. However, a Division, Office or Directorate may elect to designate funds to help support projects that have particularly noteworthy characteristics or potential, which possibly could result from an interdisciplinary approach.

5. What should I do if I have an interdisciplinary research project that seems to be beyond the scope of any single NSF program?

Contact any Program Officer who might have expertise in or near the area of the proposed research. If the first contact is not the most appropriate, they should be able to direct you to a more relevant person. A Program Officer can also decide to discuss the proposed research with other Program Directors. You can contact one of the Points of Contact identified on this site, or you can make initial contact with NSF through this site (email: idr@nsf.gov, telephone: (703) 292-4840). See “Whom Does One Contact” for more information.