Developing an Excellent Education Plan for your Faculty Early Career Development (CAREER) Program Proposal

A Workshop Presented by the Delta Program in Research, Teaching, and Learning, WISCIENCE, and the Wisconsin Alumni Research Foundation (WARF)

Wednesday, June 7th, 2017

8:30 – 10:30 am

Discovery Building, H.F. DeLuca Forum

Agenda

Introductions and Overview	5-10 min
Individual reflection on worksheet	5 min
Overview of CAREER award *Trina McMahon*, Civil and Environmental Engineering/Bacteriology Faculty co-Director, Delta Program trina.mcmahon@wisc.edu	20 min
Individual reflection on worksheet	5 min
Ideas and Advice from Successful CAREER Awardees *Anthony Gitter*, Assistant Professor, Department of Biostatistics & Medical Informatics gitter@biostat.wisc.edu *Melih Eriten*, Professor, Mechanical Engineering eriten@wisc.edu	30 min
Individual reflection on worksheet	5 min
Introduction to Campus Resources/Networking (see description on reverse) *David Bloom & Heather Shimon*, Steenbock Memorial Library *Chris Castro*, Madison Teaching and Learning Excellence Program *Cameron Cook*, Research Data Services *David Gagnon*, Field Day Lab *Anne Lynn Gillian-Daniel*, UW-MRSEC Interdisciplinary Education Group *Arianna Murphy*, Wisconsin Science Museum *Kevin Niemi*, WISCIENCE *Travis Tangen*, WARF Education & Outreach / Discovery Outreach *Devin Wixon & Jess Maher*, Delta Program in Research, Teaching and Learning	30 – 40 min
Wrap-up	5 min
Workshop evaluation	5 min

DELTA Integrating Research, Teaching, and Learning

CIRTL Network Center for the Integration of Research, Teaching, and Learning

WISCIENCE Learn • Teach • Share

WARF Wisconsin Alumni Research Foundation

Campus Resources:

David Bloom & Heather Shimon, **Steenbock Memorial Library**

david.bloom@wisc.edu & heather.shimon@wisc.edu

UW-Madison Libraries are partners throughout the life-cycle of STEM research, teaching and learning. To that end, we are available to work with you as you contribute to the scholarship of your discipline and engage with students and our wider community.

Chris Castro, **Madison Teaching and Learning Excellence Program**

ccastro4@wisc.edu

Madison Teaching and Learning Excellence (MTLE) is a two-semester program in teaching that helps early-career faculty succeed with personalized support from a cross-disciplinary community of peers and teaching and learning experts. MTLE aims to enhance student learning by helping early-career faculty become fast, effective, efficient starters in teaching, resulting in more time and energy to devote to their research, outreach, and service.

Cameron Cook, **Research Data Services**

cccook3@wisc.edu

Research Data Services (RDS) is an interdisciplinary organization committed to advancing research data management practice on the UW-Madison campus. RDS can provide assistance with data management plans, individual consultations, and education and training on data management topics.

David Gagnon, **Field Day Lab**

david.gagnon@wisc.edu

Field Day collaborates with researchers to develop educational apps and games that communicate research to the public.

Anne Lynn Gillian-Daniel, **UW-MRSEC Interdisciplinary Education Group**

agillian@wisc.edu

The Interdisciplinary Education Group of the UW MRSEC works with scientists develop accessible, hands-on activities designed to teach K-12 students and the general public about cutting-edge research. We also run a Research Experiences for Teachers (RET) summer program that gives local teachers an opportunity to engage in research and develop classroom modules based upon their experiences.

Imogen Hurley, **UW-Madison Office of Postdoctoral Studies**

ihurley@wisc.edu

The UW–Madison Office of Postdoctoral Studies strives to enhance the postdoctoral training experience. A central tenet of this mission is to assist faculty in the recruitment, mentoring and professional development of postdoctoral trainees.

Arianna Murphy, **Wisconsin Science Museum**

arianna@wisconsinsciencemuseum.org

The Wisconsin Science Museum bridges science to the public through free, high quality exhibits and outreach programs. We use art, artifacts and interactives in our exhibits, and hands-on demos and STEAM activities in our programs; but most importantly, we rely on close collaboration with researchers in academia and industry to truly inspire the public about the wonders of Science in Wisconsin.

Kevin Niemi, **WISCIENCE**

kjniemi@wisc.edu

WISCIENCE can assist with connecting scientists with many community groups of youth and adults through its Adult Role Models in Science program. WISCIENCE is also the recipient of an NSF grant along with the Discovery group on campus that will research Broader Impact activities. Funds for partners in this research are also available.

Travis Tangen, WARF Education & Outreach / Discovery Outreach

TTangen@warf.org

A key mission of Dis-covery Outreach (WARF & Morgridge Institute for Research) is to support the broader impacts effort of the UW-Madison campus community by devel-oping a unique set of options to support public engagement in informal science learning at the Discovery Building. We have infrastructure and a large scale of program options that can align across many different broader impacts options for your NSF career award application.

Devin Wixon & Jess Maher, **Delta Program in Research, Teaching and Learning**

wixon@wisc.edu & jessica.maher@wisc.edu

The Delta Internship program offers faculty and instructional staff an opportunity to partner with a UW Madison graduate student or post-doc to explore student learning challenges. Delta interns design, implement and assess innovative teaching projects in the faculty partner's course, such as adding active learning strategies, efficiently leveraging technology, or developing group assignments that follow best practices. For more information, contact: internship@delta.wisc.edu.

Working Document:
Your CAREER Education Plan

1. What are perceptions or stereotypes that you think the general public has about STEM in general, and your discipline specifically?

2. How can the work that you do, beyond your research findings, positively impact society?

3. What part of your research do you hope to infuse into your education plan?

4. What audience are you targeting (e.g., K-12 students, ? Why are you targeting them? Have you considered issues of diversity and under-representation in this selection?

5. How will you locate/recruit your proposed audience to your project?

6. What other efforts on campus can you connect with to improve the success and impact of your efforts?

7. Give 2-3 specific ideas for how you are going to implement your plan. What evidence can you provide that you can actually carry your plan out successfully?

8. What are 2-3 objectives you are thinking of including in your education plan?

9. What are 2-3 outcomes you hope will come out of your plan?

10. How will you evaluate your success? How will you know if/when you have achieved each of your expected outcomes?

11. How will you phase the implementation of your plan over the entire grant period?

Important Text from the CAREER Proposal Call 2017

Full text at: https://www.nsf.gov/pubs/2017/nsf17537/nsf17537.pdf

A. CAREER Program

This premier program emphasizes the importance the Foundation places on the early development of academic careers dedicated to stimulating the discovery process in which the excitement of research is enhanced by inspired teaching, enthusiastic learning, and disseminating new knowledge. Effective integration of research and education generates a synergy in which the process of discovery stimulates learning, and assures that the findings and methods of research and education are quickly and effectively communicated in a broader context and to a large audience.

The CAREER program embodies NSF's commitment to encourage faculty and academic institutions to value and support the integration of research and education. Successful Principal Investigators will propose creative, effective research and education plans, developed within the context of the mission, goals, and resources of their organizations, while building a firm foundation for a lifetime of contributions to research, education, and their integration.

Integration of Research and Education - All CAREER proposals should describe an integrated path that will lead to a successful career as an outstanding researcher and educator. NSF recognizes that there is no single approach to an integrated research and education plan, but encourages all applicants to think creatively about the reciprocal relationship between the proposed research and education activities and how they may inform each other in their career development as both outstanding researchers and educators. These plans should reflect the proposer's own disciplinary and educational interests and goals, as well as the needs and context of his or her organization. Because there may be different expectations within different disciplinary fields and/or different organizations, a wide range of research and education activities may be appropriate for the CAREER program. In addition, NSF recognizes that some investigators, given their individual disciplinary and career interests, may wish to pursue an additional activity such as entrepreneurship, industry partnerships, or policy that enhances their research and education plans. Proposers are encouraged to communicate with the CAREER contact or cognizant Program Officer in the Division closest to their area of research to discuss the expectations and approaches that are most appropriate for that area (see http://www.nsf.gov/crssprgm/career/contacts.jsp for a list of CAREER contacts by division).

Project Description:

The Project Description section should contain a well-argued and specific proposal for activities that will, over a 5-year period, build a firm foundation for a lifetime of contributions to research and education in the context of the Principal Investigator's organization. The proposed project should aim to advance the employee's career goals and job responsibilities as well as the mission of the department or organization. The Project Description may not exceed 15 pages.

The Project Description should include:

- a description of the proposed research project, including preliminary supporting data where appropriate, specific objectives, methods and procedures to be used, and expected significance of the results;
- a description of the proposed educational activities and their intended impact;
- a description of how the research and educational activities are integrated or synergistic; and
- results of prior NSF support, if applicable.

Successful applicants will propose creative, effective research and education plans, along with strategies for assessing these components. The proposed activities should help applicants develop in their careers as both outstanding researchers and educators. While excellence in both education and research is expected, activity of an intensity that leads to an unreasonable workload is not. The research and educational activities do not need to

be addressed separately if the relationship between the two is such that the presentation of the integrated project is better served by interspersing the two throughout the Project Description.

Proposed research activities may be in any area of science, mathematics, engineering and education normally supported by NSF. To help determine the appropriateness of the project for NSF and identify the disciplinary program to which it should be submitted, proposers are urged to refer to the NSF Guide to Programs. Program information can also be found on Directorate web pages, which can be accessed from the NSF home page (http://www.nsf.gov/). Proposers are also encouraged to contact the appropriate NSF Program Officer before submitting the proposal.

Education Activities – The education component of the proposal may be in a broad range of areas and may be directed to any level: K-12 students, undergraduates, graduate students, and/or the general public, but should be related to the proposed research and consistent with the career goals of the PI. Some examples are: incorporating research activities into undergraduate courses; teaching a graduate seminar on the topic of the research; designing innovative courses or curricula; providing mentored international research experiences for U.S. students; linking education activities to industrial, international, or cross-disciplinary work; supporting teacher preparation and enhancement; conducting outreach and mentoring activities to enhance scientific literacy or involve students from groups that have been traditionally underrepresented in science; researching students' learning and conceptual development in the discipline; implementing innovative methods for evaluation and assessment; or creating cyberinfrastructure that facilitates involvement of the broad citizenry in the scientific enterprise. Education activities may also include designing new or adapting and implementing effective educational materials and practices. Such activities should be consistent with research and best practices in curriculum, pedagogy, and evaluation. Proposers may build on, or otherwise meaningfully participate in, existing NSF-supported activities or other educational projects ongoing on campus.

Cross-Disciplinary Perspectives – NSF recognizes that disciplinary boundaries evolve with time and that inter-, multi-, trans-disciplinary approaches are often needed to push the frontiers of research and education. We invite proposals from early-career investigators who wish to pursue research and education activities that cross disciplinary boundaries. Increasingly, CAREER proposals are co-reviewed by more than one program within a Division or a Directorate, or across Directorates/Offices. We encourage investigators to seek research and education collaborations with partners in other areas of academia as well as from other sectors (for example, partnerships with industry, national laboratories, schools and school districts, or museums). Investigators have the option of including the associated costs in the budget line items of the proposal, or in subawards to another institution for all necessary research and educational activities (for example, hiring an external evaluator, or securing time at a shared research facility). Because the CAREER program is designed to foster individual career development, partners or collaborators may not be listed as co-principal investigators on the cover page. If critical for a given project, support for collaborators may be requested in the senior personnel or consultant services budget line items of the proposal, or in subawards to another institution. However, while recognizing that projects may entail cross-disciplinary collaborations, it is expected that the primary support for a CAREER award will be for the PI and his/her research efforts, with support for other senior personnel commensurate with their limited role in the project. Proposals submitted with co-principal investigators will be returned without review. Ensuring that the CAREER program continues to focus on fostering individual career development of early-career scientists and engineers will be an integral part of the merit review of CAREER proposals.

Cross-Sector Perspectives – NSF recognizes that individual investigators may have disciplinary and career interests that enhance their research and education plans through an additional activity such as entrepreneurship, industry partnerships, or policy. We invite proposals from early-career investigators who wish to enhance their research and education activities along these lines. If critical for a given project, investigators have the option of including the associated costs in the budget line items of the proposal or in subawards to another institution.

Scientific Software Development – Proposed research activities may involve development of innovative scientific software, along with related studies of reproducibility, provenance, usability, security, adoption, and sustainability of the software, as well as its adaptability to emerging technologies and requirements. If software

artifacts are anticipated in a given project, investigators should state and justify which software license(s) will be used for the released software.

International/Global Dimensions – NSF encourages CAREER Principal Investigators to include international/global dimensions in their projects. As appropriate, the CAREER proposal should delineate how its activities fit within the context of expertise, facilities, data, and other resources that are being applied globally in relevant areas of research and education, and how the CAREER award would position the Principal Investigator and his/her organization to take a leadership role. If applicable, the proposal should clearly state how the research and education activities will be enhanced by international engagements, and should describe the benefits to participants in the U.S. and abroad. If an international component is included, proposers are encouraged to contact the relevant country Program Officer in the Office of International Science and Engineering (OISE) listed in http://www.nsf.gov/od/iia/ise/country-list.jsp.

Field Work in the Polar Regions – For guidance on submitting information about field work proposed in the Arctic or Antarctica, proposers should contact the Program Officer in Polar Programs (http://www.nsf.gov/div/index.jsp?div=PLR) who is associated with the program most closely aligned with the research being proposed.

Proposals Requiring Seagoing Facilities – For guidance on submitting proposals that require use of sea-going facilities such as ships (including those participating in the University National Oceanographic Laboratory System [UNOLS], foreign vessels under charter or other arrangements, submersibles, remotely operated vehicles, autonomous underwater vehicles, etc.), proposers should contact the Program Officer in Ocean Sciences (http://www.nsf.gov/div/index.jsp?div=OCE) who is associated with the program most closely aligned with the research being proposed.

Relevant resources

National Research Council. (2000). *How People Learn: Brain, Mind, Experience, and School*. Committee on Developments in the Science of Learning. Bransford, J.D., Brown, A.L., Cocking, R.R., Editors. with additional material from the Committee on Learning Research and Educational Practice. Donovan, M.S., Bransford, J.D., and Pellegrino, J.W., Editors.

National Research Council. (2001). *Adding it up: Helping children learn mathematics*. Mathematics Learning Study Committee. Kilpatrick, J., Swafford, J., and Findell, B., Editors.

National Research Council. (2001). *Knowing what students know: The science and design of educational assessment*. Committee on the Foundations of Assessment. Pellegrino, J., Chudowsky, N., and Glaser, R., Editors

National Research Council. (2002). *Scientific research in education*. Committee on Scientific Principles for Education Research. Shavelson, R.J., and Towne, L., Editors.

National Research Council. (2007). *Taking Science to School: Learning and Teaching Science In Grades K-8*. Duschl, R. A, Schweingruber, H. A, and Shouse, A. W., Editors.

National Research Council. (2009). *Learning in Informal Environments: People, Places, and Pursuits.* Bell, P., Lewenstein, B., Shouse, A. W., and Feder, M. A., *Editors*.

National Research Council. (2010). *Surrounded by Science: Learning Science in Informal Environments.* Fenichel, M. and Schweingruber, H.A., *Editors.*

Broadening Participation in Graduate Education (2009) - http://www.cgsnet.org/broadening-participation-graduate- education - 0

National Lab Network - http://www.nationallabnetwork.org/
Broadening Participation in Computer Sciences portal - http://www.bpcportal.org/

A CAREER proposal must indicate the goals and objectives of the proposed education activities, how it will be integrated with the research component, and the criteria for assessing how these goals will be met. Principal investigators are strongly encouraged to describe how the impact of the educational activities will be assessed or evaluated. A helpful document for information on evaluating educational activities is the NSF publication *The 2002 User-Friendly Handbook for Project Evaluation* (NSF 02-057).

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- Intellectual Merit: The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- Broader Impacts: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Proposal & Award Policies & Procedures Guide (PAPPG), January 2017

Printable Version: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp

Chapter III: NSF Proposal Processing and Review

Proposals received by NSF are assigned to the appropriate NSF program and are assessed to ensure that they meet NSF compliance requirements. All compliant proposals are then carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as ad hoc reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposal review is one step in the NSF program planning and implementation process. Embedded in this process are core strategies that are fundamental to the fulfillment of NSF's mission. More information about NSF's mission and strategies can be found in Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

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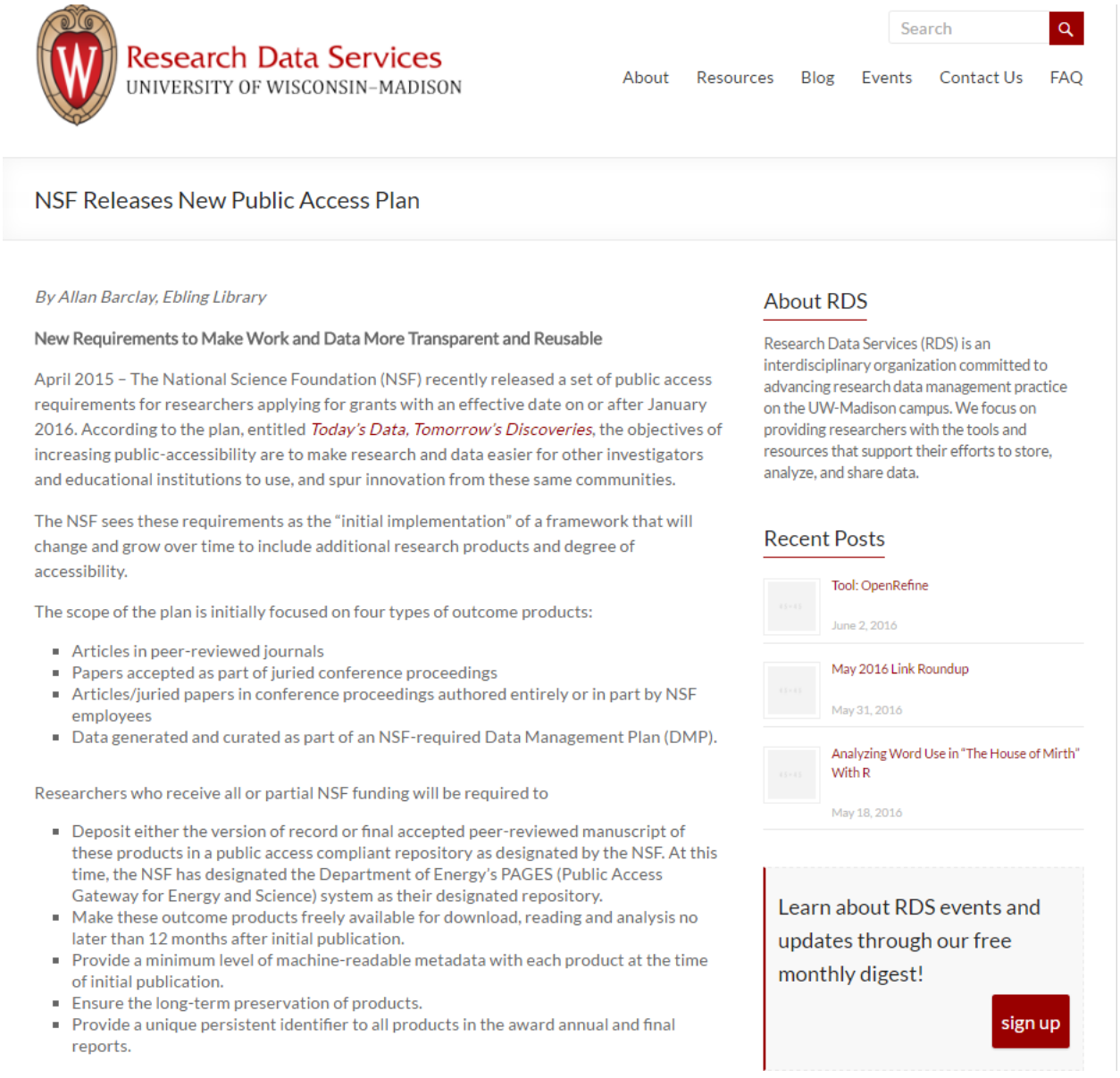
UW-Madison, NSF public access plan (2017):

http://researchdata.wisc.edu/news/nsf-releases-new-public-access-plan/



Research Data Services
UNIVERSITY OF WISCONSIN–MADISON

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NSF Releases New Public Access Plan

By Allan Barclay, Ebling Library

New Requirements to Make Work and Data More Transparent and Reusable

April 2015 – The National Science Foundation (NSF) recently released a set of public access requirements for researchers applying for grants with an effective date on or after January 2016. According to the plan, entitled *Today's Data, Tomorrow's Discoveries*, the objectives of increasing public-accessibility are to make research and data easier for other investigators and educational institutions to use, and spur innovation from these same communities.

The NSF sees these requirements as the "initial implementation" of a framework that will change and grow over time to include additional research products and degree of accessibility.

The scope of the plan is initially focused on four types of outcome products:

- Articles in peer-reviewed journals
- Papers accepted as part of juried conference proceedings
- Articles/juried papers in conference proceedings authored entirely or in part by NSF employees
- Data generated and curated as part of an NSF-required Data Management Plan (DMP).

Researchers who receive all or partial NSF funding will be required to

- Deposit either the version of record or final accepted peer-reviewed manuscript of these products in a public access compliant repository as designated by the NSF. At this time, the NSF has designated the Department of Energy's PAGES (Public Access Gateway for Energy and Science) system as their designated repository.
- Make these outcome products freely available for download, reading and analysis no later than 12 months after initial publication.
- Provide a minimum level of machine-readable metadata with each product at the time of initial publication.
- Ensure the long-term preservation of products.
- Provide a unique persistent identifier to all products in the award annual and final reports.

About RDS

Research Data Services (RDS) is an interdisciplinary organization committed to advancing research data management practice on the UW-Madison campus. We focus on providing researchers with the tools and resources that support their efforts to store, analyze, and share data.

Recent Posts

Tool: OpenRefine
June 2, 2016

May 2016 Link Roundup
May 31, 2016

Analyzing Word Use in "The House of Mirth" With R
May 18, 2016

Learn about RDS events and updates through our free monthly digest!

sign up

The NSF expects that investigators will be able to deposit research products into the PAGES system by the end of the 2015 calendar year. Data underling journal article or conference paper findings should be deposited in a repository as specified by the publication or as described in the research proposal's DMP.

Public access requirement specifics will be provided in future NSF documents and grant solicitations.

For more information on how these new requirements could affect your grant proposal, contact the solicitation's Cognizant Program Officer or the UW-Madison's Research Data Services.

Cameron Cook April 27, 2015 Data Sharing, Federal Funders, News

← Final Spring Holz Brown Bag Talk

Building a Practical DM Foundation →

UW Researchers on RDS

> *RDS members and instructors have a broad and interdisciplinary background, and are extremely friendly and helpful! We look forward to further exchanges and interactive activities with RDS!*

Catalina M. Dept. of Forest and Wildlife Ecology

Some NSF-Supported Initiatives at UW-Madison
To Leverage in Your Proposal

CIRTL - Center of the Integration of Research, Teaching and Learning Network

CIRTL, a national network of 21 institutions, promotes the development of a national faculty in science, technology, engineering, and mathematics (STEM) committed to implementing and advancing effective teaching practices for diverse student audiences as part of their professional careers. To accomplish these goals CIRTL is founded on three pillars: Teaching-as-Research, Learning Communities and Learning-through-Diversity. The local implementation of CIRTL at UW-Madison is The Delta Program in Research, Teaching, and Learning.

For more information visit: **www.cirtl.net** and **www.delta.wisc.edu**

WiscAmp – Wisconsin Alliance for Minority Participation

WiscAMP aims to address retention and persistence of underrepresented minorities in STEM disciplines by expanding and improving on successful models already in place and fostering and sustaining an alliance among partner institutions.

For more information visit: **wiscamp.engr.wisc.edu/**

WISELI – Women in Science, Engineering and Leadership Institute

The long-term goal of WISELI is to have the gender of the faculty, chairs, and deans reflect the gender of the student body. To accomplish these goals, WISELI will be a visible, campus-wide entity, endorsed by top-level administrators, which will use UW-Madison as a "living laboratory" to study the problem and implement solutions.

For more information visit: **wiseli.engr.wisc.edu**

IEG UW MRSEC – Materials Research Science and Engineering Center Interdisciplinary Education Group

This program uses examples of nanotechnology and advanced materials to explore fundamental science and engineering concepts at the college level and to share the "wow" and potential of these fields with public audiences. They work to enhance public understanding of science and engineering through a central theme of "Exploring the Nanoworld, Innovating through Materials" using web dissemination to a range of educators, presentations in public venues, and contributions to popular publications and media.

For more information visit: **http://mrsec.wisc.edu/Edetc/**

NSEC- Nanoscale Science and Engineering Center

This group addresses grand challenges associated with directed assembly of nanoscale materials into functional systems and architectures through the use of self-assembly, chemical patterning, and external fields. Public dialogue, analysis of governmental regulation, and environmental health and safety research are integral components of the Center. The NSEC operates an ambitious and unique education and outreach program aimed at cultivating the next generation of nanoscale science and engineering experts with diverse and interdisciplinary backgrounds.

For more information visit: **http://www.nsec.wisc.edu**

DELTA Integrating Research, Teaching, and Learning

CIRTL Network Center for the Integration of Research, Teaching, and Learning

WISCIENCE Learn · Teach · Share

WARF Wisconsin Alumni Research Foundation

CHANGE-IGERT -Certificate on Humans and the Global Environment

The Certificate on Humans and the Global Environment (CHANGE) established a workgroup that aids a small amount of new PhD students each year. The CHANGE program involves faculty members in departments ranging across atmospheric and oceanic sciences, ecology, environmental studies, veterinary medicine, and sociology. An objective of the CHANGE program is to train graduate students to work on environmental problems as a group. Students are encouraged to expand their collaborative efforts beyond the classroom through client-based project work and academic publications.

For more information visit: **http://www.nelson.wisc.edu/graduate/change/index.php**

Talking About Leaving, Revisited

This five-year study builds on research by Elaine Seymour and Nancy Hewitt that found poor teaching was the most significant influence on STEM majors' decisions to switch fields. Seymour and Hewitt's 1997 book Talking about Leaving: Why Undergraduates Leave the Sciences subsequently spurred nationwide efforts to improve teaching in STEM courses and to retain more students of color and women into STEM fields. This new study, known as Talking about Leaving Revisited, will investigate whether rates of switching from STEM majors—and students' experiences in the process—have changed since efforts to improve college science teaching began 15 years ago.

For more information visit: **http://talr.wceruw.org/**

PREP – Psychological Research Experience Program

The Psychology Research Experience Program (PREP) provides intensive mentoring and experience in scientific research and professional development to undergraduates from historically underrepresented populations who have expressed and demonstrated an interest in a career in scientific psychology.

For more information visit:
https://psych.wisc.edu/PREP%20Application%20and%20Selection.htm

Water Sustainability and Climate In the Yahara Watershed

The project is part of an endeavor to understand the interactions between water, climate, land use, infrastructure, and ecosystems through place-based research and innovative methods.

For more information visit: **https://wsc.limnology.wisc.edu/about/project**

CHTC – The Center for High Throughput Computing

The Center for High Throughput Computing (CHTC) offers a variety of large-scale computing resources and services for UW-affiliated researchers and their collaborators, including classically-defined high-throughput computing (HTC) and high-performance computing (HPC) resources.

For more information visit: **http://chtc.cs.wisc.edu**

IceCube Neutrino Observatory

IceCube is a particle detector at the South Pole that records the interactions of a nearly massless subatomic particle called the neutrino. IceCube searches for neutrinos from the most violent astrophysical sources: events like exploding stars, gamma-ray bursts, and cataclysmic phenomena involving black holes and neutron stars. The IceCube telescope is a powerful tool to search for dark matter and could reveal the physical processes associated with the enigmatic origin of the highest energy particles in nature. The University of Wisconsin–Madison is the lead institution responsible for the maintenance and operations of the detector.

For more information visit: **https://icecube.wisc.edu/**

Research Experience for Undergraduates

Current programs partially funded by NSF at UW-Madison
https://grad.wisc.edu/diversity/srop/

Integrated Biological Sciences Summer Research Program

Amber Smith, Faculty Associate for Research Mentor
Email: amber.smith@wisc.edu
Website: https://wiscience.wisc.edu/IBS-SRP

Biochemistry & Biophysics
Kelley Harris-Johnson (kelleyharris@wisc.edu)

Bioenergy
John Greenler (jgreenler@glbrc.wisc.edu)

Cellular and Molecular Biology
Jessica Skarlupka (cmb@bocklabs.wisc.edu)

Computational Biology and Biostatistics
Whitney A. Sweeney (sweeney@biostat.wisc.edu)

Ecology, Plants and Environmental Systems
Robert Beattie (rbeattie@wisc.edu)

Molecular & Environmental Toxicology
Eileen Stevens (emstevens@wisc.edu)

Neurobiology
Mallory Musolf (musolf@wisc.edu)

Virology
Johan den Boon (jdenboon@morgridgeinstitute.org)

Research Experience for Undergraduates (REU)

Program Director: Dr. Andrew Greenberg
Email: andrew.greenberg@wisc.edu
Website: https://www.chem.wisc.edu/content/research-experience-undergraduates-reu

REU in Chemistry and Chemical and Biological Engineering
http://reu.che.wisc.edu/ChemCBE_REU/ChemCBE_REU.html

REU in Nanotechnology
http://reu.che.wisc.edu/Nano_REU/Nano_REU.html

REU in the Chemistry of Materials for Renewable Energy
http://reu.che.wisc.edu/CMRE_REU/CMRE_REU.html

Psychology Research Experience Program (PREP)
Email: prep@psych.wisc.edu
Website: https://psych.wisc.edu/PREP%20Application%20and%20Selection.htm

Research Experience for Undergraduates – Astrophysics
Eric Hooper, Director
Email: reu@astro.wisc.edu
Website: http://www.astro.wisc.edu/undergrads/uw-madison-reu-program/

Research Experience for Undergraduates – Microbiology
Jon Roll, Program Director
Email: jtroll@wisc.edu
Website: http://www.bact.wisc.edu/pro_reu.php

Summer Education Research Program (SERP)
Ruttanatip (Dang) Chonwerawong, Program Director, Coordinator
Email: rchonwer@education.wisc.edu
Website: http://www.education.wisc.edu/serp/

Summer Undergraduate Research Experience –SURE/REU (Engineering)
Kelly Burton, Program Coordinator
Email: gers@engr.wisc.edu
Website: http://gers.engr.wisc.edu/sure.php

UW-Madison CAREER Award Recipients – previous 7 years
List current as of May 2017

Name	Award Date	Department
Randolph Ashton	02/23/2017	Biomedical Engineering
Aws Albarghouthi	02/10/2017	Computer Sciences
Martina Rau	02/03/2017	Educational Psychology
Steven Sam	01/23/2017	Mathematics
Betsy Stovall	01/10/2017	Mathematics
Tullia Dymarz	6/1/2016	Department of Medical Sciences
Jun Yin	6/1/2016	Department of Medical Sciences
Robert Roth	6/1/2016	Geography
Anthony Gittter	3/23/16	Biostatistics & Medical Informatics
Prashant Sharma	3/1/2016	Zoology
Melih Eriten	2/1/2016	Mechanical Engineering
Bulent Sarlioglu	2/1/2016	Electrical and Computer Engineering
Christy Tremonti	1/1/2016	Astronomy
Xuehua Zhong	12/15/2015	Microbiology
Timothy Bertram	8/1/2015	Agricultural Sciences
Christina Remucal	7/1/2015	Civil and Environmental Engineering
Etienne Garand	4/1/2015	Chemistry
Oliver Schmitz	3/1/2015	Engineering Physics
Daniel Ludois	2/15/2015	Electrical and Computer Engineering
Sushmita Roy	8/1/2014	Biostatistics
Richard Kent	7/1/2014	Mathematics
Erika Marin-Spiotta	6/15/2014	Geography
Krishanu Saha	6/1/2014	Biomedical Engineering
Clifford Thurber	6/1/2014	Geology
Michael Arnold	5/15/2014	Engineering
Marisa Otegni	4/19/2014	Molecular Biology
Xinyu Zhang	4/1/2014	Engineering
Donna Fernandez	3/11/2014	Molecular Biology
Kurt Amann	11/25/2013	Molecular Biology
Michael Graham	8/23/2013	Physics
David Anderson	8/6/2013	Mathematics
Basil Tikoff	7/31/2013	Earthscience and Geology
Snezana Stanimirovic	7/16/2013	Astronomy
Shanon Peters	7/3/2013	Earthscience and Geology
David Wassarman	5/30/2013	Genetics
Laurence Loewe	5/15/2013	Biology
Patrick Krysan	3/21/2013	Biotechnology
Micheal Sheets	3/21/2013	Genetics
George Huber	1/31/2013	Chemical and Biological Engineering

Corinna Gries	7/16/2012	Genetics
Peter Shanan	7/1/2012	Geology
Benjamin Recht	6/1/2012	Computer Science
Laurence Loewe	6/1/2012	Genetics
Brian Pfleger	6/1/2012	Chemical and Biological Engineering
Xudong Wang	5/1/2012	Materials Science and Engineering
Reina Maruyama	5/1/2012	Physics
David Rothamer	2/1/2012	Mechanical Engineering
Bilge Mutlu	9/15/2011	Computer Science
Snezana Stanimirovic	9/15/2011	Astronomy
Benedek Valko	9/1/2011	Mathematics
Douglas Weibel	8/16/2011	Biochemistry
Andrej Zlatos	8/1/2011	Mathematics
Shan Lu	6/2/2011	Computer Science
Jennifer Reed	6/1/2011	Chemical and Biological Engineering
Zhiguang Qian	6/1/2011	Statistics
Jennifer Reed	6/1/2011	Chemical and Biological Engineering
Christopher Re	5/1/2011	Computer Science
Nader Behdad	4/1/2011	Electrical and Computer Engineering
Azadeh Davoodi	1/1/2011	Electrical and Computer Engineering
Pamela Kreeger	3/15/2010	Biomedical Engineering
Maxim Vavilov	3/15/2010	Physics
Amy Ellis	3/15/2010	Curriculum and Instruction
Jingshan Li	3/15/2010	Industrial and System Engineering
James Luedtke	2/1/2010	Industrial Engineering and Computer Sciences
Shaoqin Gong	1/1/2010	Biomedical Engineering

Merit Review Criterion: Broader Impacts (Chemistry Examples)

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13626&org=CHE&from=home

SYNOPSIS

Merit Review Criterion: Broader Impacts

All proposals submitted to the National Science Foundation are evaluated through use of two National Science Board approved merit review criteria. The two merit review criteria are 1) What is the intellectual merit of the proposed activity? and 2) What are the broader impacts of the proposed activity? Proposals that do not separately address both merit review criteria within the Project Summary and Project Description will be returned without review.

Guidance regarding the merit review criterion of broader impacts and examples illustrating activities likely to demonstrate broader impacts are available in Chapter III of the Grant Proposal Guide section of the Proposal and Award Policies and Procedures (PAPP) Guide, http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp.

In addition to the guidelines and examples provided by the PAPP Guide, below is a list of examples demonstrating how the chemistry community has addressed the merit review criterion of broader impacts:

- Offering national or international summer research or outreach programs for middle and high school students, high school teachers, or undergraduate students including many from underrepresented groups.
- Organizing national and international workshops or symposia for faculty or students.
- Training and mentoring students to be future professionals.
- Strengthening the chemical workforce through curriculum development.
- Implementing strategies to increase the number of women and minority chemists in tenured academic positions in research universities.
- Updating curriculum by writing texts or developing new classroom instructional materials and laboratory experiments.
- Introducing students to authentic research experiences in the first- and second-year chemistry laboratory curriculum.
- Working with science centers to disseminate their research and educational activities to a broad audience via exhibits, outreach programs, activities or events.
- Mentoring junior faculty.
- Serving as a journal editor or peer reviewer for grants and publications.
- Preparing new compounds, materials, techniques or devices of industrial, medical, environmental, or computational significance.
- Identifying more effective ways to use existing energy resources. Discovering new or renewable energy sources.
- Developing new sensors, technology or instrumentation for national security.
- Forming start-up companies for manufacturing or distributing new products or technologies.

- Writing scholarly review articles for peer reviewed journals or less technical articles for the public.
- Participating in interdisciplinary research or educational activities.
- Contributing to cyber-enabled chemistry activities such as participating with or establishing a team of researchers who can assemble distributed expertise and resources in a virtual lab to target chemical research and education priorities.
- Collaborating with industrial or government colleagues.
- Establishing international research collaborations.
- Assisting journalists with their articles and press releases on technical topics.
- Developing new art forms for communicating science to wider audiences.
- Designing new routes to commodity or fine chemicals.
- Designing safer laboratory procedures or environmentally benign processes.

Broader impact activities are a critical element for the long-term health, vitality, and infrastructure of the chemistry discipline. They contribute to new discoveries and understandings, an enhanced infrastructure for research and education, broad dissemination of research results, recruitment of a diverse workforce, professional development of co-workers and effective communication with non-specialist audiences regarding the societal benefits of the research being conducted. Collectively, the broader impact of the research and educational activities being completed by the chemistry community represents a success story that should be widely shared.

We hope that the above guidelines and examples will assist you with addressing and incorporating the merit review criterion of broader impacts within your proposal.

UW-Madison resource:

Office of Postdoctoral Studies

Office of the Vice Chancellor for Research and Graduate Education
University of Wisconsin-Madison
8505 Wisconsin Institutes for Research
1111 Highland Avenue, Madison, WI 53705
ihurley@wisc.edu | 608 265 6225

Example Postdoctoral Researcher Mentoring Plan

Adapted from: https://www.nsf.gov/eng/iip/sbir/Sample_Postdoc_Mentoring_Plan.doc

This Postdoctoral Researcher Mentoring Plan has been prepared by <organization name>. The Plan establishes guidelines for work to be performed by a Postdoctoral Researcher in support of the NSF <SBIR or STTR> <Phase I or Phase II> Project Awarded to <company name>, entitled "<title of project>". The Postdoctoral Researcher assigned to the project will work in <name/university> laboratory and will conduct research on <name tasks>.

1. Orientation will include in-depth conversations between <company researcher name> and the Postdoctoral Researcher. Mutual expectations will be discussed and agreed upon in advance. Orientation topics will include (a) the amount of independence the Postdoctoral Researcher requires, (b) interaction with coworkers, (c) productivity including the importance of scientific publications, (d) work habits and laboratory safety, and (e) documentation of research methodologies and experimental details so that the work can be continued by other researchers in the future.

2. Career Counseling will be directed at providing the Postdoctoral Researcher with the skills, knowledge, and experience needed to excel in his/her chosen career path. In addition to guidance provided by <post doc researcher name>, the Postdoctoral Researcher will be encouraged to discuss career options with researchers and managers at <university name> and with former students and colleagues of < post doc researcher name>.

3. Teaching and Mentoring Skills will be developed through professional development activities around teaching through the Delta Program in Research, Teaching and Learning at UW-Madison or the national Center for the Integration of Research, Teaching and Learning (CIRTL) Network. < post doc researcher name> will attend workshops, seminars and/or courses offered by the Delta program or CIRTL to learn to teach effectively. For example, Delta's College Classroom course will provide < post doc researcher name> with fundamental pedagogical skills. Delta's Research Mentor Training seminar will prepare < post doc researcher name> to effectively mentor graduate and undergraduate students. Additional skills will be developed in the context of regular meetings within <university name> research group during which graduate students and postdoctoral researchers describe their work to colleagues within the group and assist each other with solutions to challenging research problems, often resulting in cross fertilization of ideas.

4. Instruction in Professional Practices will be provided on a regular basis in the context of the research work and will include fundamentals of the scientific method, laboratory safety, and other standards of professional practice. In addition, the Postdoctoral Researcher will be encouraged to affiliate with one or more professional societies in his/her chosen field.

5. Experience with Preparation of Grant Proposals will be gained by direct involvement of the Postdoctoral Researcher in proposals prepared by <company name>. The Postdoctoral Researcher will have an opportunity to learn best practices in proposal preparation including identification of key research questions, definition of objectives, description of approach and rationale, and construction of a work plan, timeline, and budget.

6. Publications and Presentations are expected to result form the work supported by the grant. These will be prepared under the direction of < post doc researcher name> and in collaboration with researchers at <company name> as appropriate. The Postdoctoral Researcher will receive guidance and training in the preparation of manuscripts for scientific journals and presentations at conferences.

7. Technology Transfer activities will include regular contact with researchers at <company name>. The Postdoctoral Researcher will be given an opportunity to become familiar with the university-industry relationship including applicable confidentiality requirements and preparation of invention disclosure applications.

8. Success of the Mentoring Plan will be assessed by monitoring the personal progress of the Postdoctoral Researcher through a tracking of the Postdoctoral Researcher's progress toward his/her career goals after finishing the postdoctoral program.

LIBRARIES
University of Wisconsin-Madison

Ask a Librarian

www.library.wisc.edu

UW-Madison Libraries are partners throughout the life-cycle of STEM research, teaching and learning. To that end, we are available to work with you as you contribute to the scholarship of your discipline and engage with students and our wider community.

Teaching & Learning Research Guide for STEM & SBE:

http://researchguides.library.wisc.edu/teaching_learning

- Access databases, journals, and books related to teaching & learning in STEM & SBE.
- Find data, teaching standards, and campus partners.
- Explore opportunities for broader impact.

Consultation Services

- Schedule a library orientation for you and your research assistants.
- Get expert guidance with literature reviews.
- Customize a learning experience for your students.

Productivity Tools

- Set up current awareness services (database alerts, RSS feeds, journal table of contents updates). http://researchguides.library.wisc.edu/keepingcurrent
- Maximize citation management tool capabilities (EndNote, Mendeley, Zotero). www.library.wisc.edu/services/citation-managers

Article and Book Delivery Services

- Access books and articles that are not immediately available on campus with **Interlibrary Loan**. http://go.wisc.edu/836102
- Request delivery of materials when working in the field or abroad with **Distance Services**. http://go.wisc.edu/ayyr34

Data Management & Scholarly Publishing

- Get help with data management plans and institutional repositories through **Research Data Services**. http://researchdata.wisc.edu/
- Set up your researcher profile and track your citations with ORCiD. https://orcid.org/
- Explore our **Grants Information Collection.** http://go.wisc.edu/fh73l0
- Submit your publication for public access to comply with grant funding requirements. http://ebling.library.wisc.edu/services/public_access/index.html
- Assess and measure author, article, or journal impact. http://researchguides.library.wisc.edu/bibliometrics

Facilities

- Reserve spaces for collaboration or instruction.
- Arrange for art or other exhibits in library spaces (open or secured).
- Propose a special events partnership to host poster sessions, presentations, and more.

Network of Library Users

- Ask about our partnerships with K-12, small business professionals, independent or contract researchers, citizen scientists, university extension, etc.

Science and Engineering Libraries (SEL), University of Wisconsin-Madison

- Astronomy
- Chemistry
- Geology & Geophysics
- Math
- Physics
- Steenbock (Agriculture, Life Sciences)
- Wendt Commons (Engineering)

Partners

- Ebling (Health Sciences)
- Wisconsin Water Library

05/23/2017 KD, HS, DB

Developing an Excellent Education Plan for your Faculty Early Career Development (CAREER) Program Proposal

Evaluation

1. How did you hear about this workshop? If you heard via email, who was the email from?

2. Using the rating scale below, please indicate your satisfaction with each of the topics covered in this workshop:

Very Dissatisfied	Dissatisfied	Neither Dissatisfied or Satisfied	Satisfied	Very Satisfied
(1)	(2)	(3)	(4)	(5)

TOPIC	**RATING**
Overview of CAREER Criteria	
Experiences of successful applicants	
Introductions to campus resources and networking	

2. What aspects of this workshop did you find most useful?

3. What would be something to improve in this workshop?

4. Any other comments?

Thanks for attending!

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CIRTL Network Center for the Integration of Research, Teaching, and Learning

WISCIENCE Learn · Teach · Share

WARF Wisconsin Alumni Research Foundation