Seeking Funding from NSF’s Faculty Early Career Development (CAREER) Program
http://research.uiowa.edu/nsf-career

- Program Solicitation
- FAQs
- Sample Proposals
- Review Process
- Tips
Developing an NSF CAREER proposal

- NSF’s CAREER Program
- National Science Foundation
- Proposal Preparation
  - Crafting CAREER proposal
  - CAREER submission process
  - CAREER review process
    - Intellectual Merit
    - Broader Impacts
- Learn from former CAREER awardees
- Learn from CAREER reviewers
CAREER Program*

✧ What is it?

“A Foundation-wide activity that offers the National Science Foundation’s most prestigious 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.”

Award selection is based proposed plans to develop integrative and effective research **AND** education careers

Proposals incorporate research **AND** education

Projects are a **departure from** PhD and/or postdoctoral work

CAREER Program Goals

• Nurture the career development the next generation of researchers-educators in the context of the mission of their organization

• Effect a change in academic culture:
  – To innovate in education
  – To value integration of research and education
  – To support diversity
  – To reach out to the community at large
Eligibility Criteria

• Doctorate degree in field supported by NSF by submission deadline
• Tenure track Assistant Professor in field supported by NSF on Oct. 1 following deadline
• No previous CAREER of PECASE award
• No citizenship requirements
• 3 applications allowed (one submission per competition)
Some Award Details

- **Duration**: 5 years (versus 3-year normal)
- **Size**: min. $400K - BIO & OPP, min. $500K (minimums tend to be very close to general maximums)
- **Supplements** (contact PO before submission):
  - REU: $6K/year/student (no equipment)
  - RET: $10K to involve a K-12 teacher
  - Advancing Informal STEM Learning
  - Career-Life Balance (CLB): up to $12K for up to 3 months personnel salary support to sustain research when PI is on family leave http://www.nsf.gov/pubs/2013/nsf13075/nsf13075.pdf
Full proposal submission deadlines:

- **NSF’s: July 2013:**
  - 25th: BIO, CISE, HER, OCI
  - 26th: ENG
  - 27th: GEO, MPS, SBE, OPP

  Proposals must be submitted via FastLane by 5:00 PM submitters time

- **UI Routing Policy Procedure:** at least five (5) working days in advance of the sponsor's submission deadline:
  - [http://dsp.research.uiowa.edu/ui-routing-policy-procedure](http://dsp.research.uiowa.edu/ui-routing-policy-procedure)

  Link to Routing e-forms:
Proposal Development References:

- Program Solicitation:
- Grant Proposal Guide (GPG) January 2013: adhere strictly to formatting instructions and GPG requirements
- Overview of NSF’s Merit Review:
- NSF Publication: A Guide for Proposal Writing
- NSF CAREER Proposal Writing Tips
  http://aries.imse.ksu.edu/nsf/nsfcareer2013/subfolder/career.pdf
- Dr. George Hazelrigg, NSF Program Director:
  1. 2012 NSF CAREER Proposal Writing Workshop presentation
     http://aries.imse.ksu.edu/nsf/nsfcareer2012/Workshopdoc.htm
  2. Twelve Steps to Winning a Research Proposal
     http://www.k-state.edu/career/2009/Twelve_steps.pdf
- FAQs About CAREER Program for Submission in Years 2012, 2012, and 2013 (NSF 11-038)
NSF – Hierarchical Organization

7 Directorates: each one has divisions and programs

- BIO
- CISE
- EHR
- ENG
- GEP
- MSP
- SBE

3 Offices: each one has several programs

- OCI
- OISE
- OPP

NSF Cross Cutting Programs = interdisciplinary programs and programs supported by multiple directorates, ex: CAREER

All NSF (>200) programs open to CAREER proposals

Review and Funding methods vary according to Directorate and Division practices

4/12/2013
Must identify the most appropriate NSF program to target your proposal to for submission

  Search by keyword, awardee or program information
- Become familiar NSF programs, find the best fit, AND find out what kind of research qualifies for funding from your “best fit” program
- Ask colleagues for advice
- Find out the funding sources for projects in your area of research: award ID numbers in “acknowledgements” section of research papers
- Serve as a panelist
Contacting NSF Program Officers:

Link to CAREER Program Officers
http://www.nsf.gov/crssprgm/career/contacts.jsp

- To ascertain fit of your research objective with program
- To find out expectations for specific program
- To inquire about budget limits for specific program (max. size of awards)
- To inquire about review process for specific program

NB!: Prepare a short research summary about your proposed project beforehand: “What is your research objective?” in ≤ 25 words according to G. Hazelrigg.
# CAREER Application Package

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cover Page</td>
<td>Announcement #, NSF Unit</td>
</tr>
<tr>
<td>2. Project Summary</td>
<td>1 page</td>
</tr>
<tr>
<td>3. Table of Contents</td>
<td>Generated by FastLane</td>
</tr>
<tr>
<td>4. Project Description</td>
<td>15 pages</td>
</tr>
<tr>
<td>5. References Cited</td>
<td>For both research &amp; education</td>
</tr>
<tr>
<td>6. Biographical Sketch</td>
<td>2 pages maximum</td>
</tr>
<tr>
<td>6. Budget</td>
<td>3 pages max. for justification</td>
</tr>
<tr>
<td>8. Current &amp; Pending Support</td>
<td></td>
</tr>
<tr>
<td>9. Facilities/ Equipment/Other Resources</td>
<td></td>
</tr>
<tr>
<td>10. Departmental Letter</td>
<td>2 pages maximum</td>
</tr>
<tr>
<td>11. Collaboration Letters</td>
<td>1 page each</td>
</tr>
<tr>
<td>12. Data Management Plan</td>
<td></td>
</tr>
<tr>
<td>13. Postdoctoral Mentoring Plan</td>
<td></td>
</tr>
</tbody>
</table>
1. Cover Sheet

- Solicitation Number: NSF 11-690
- Unit of consideration
- Title – “CAREER:...”
- Co-PIs – none!
- List Suggested Reviewers or Reviewers not to include (optional)
2. Project Summary

• **NEW!** Project Summary includes text boxes in FastLane for:
  - Overview: summary of research AND educational goals, specific objectives and outline of approach
  - Statement on Intellectual Merit i.e. specific research contribution to knowledge base
  - Statement on Broader Impacts i.e. benefit to society

• Only 4,600 characters allowed within one page
• Project Summaries with special characters may be uploaded as a PDF document
• Written in 3rd person
• **NEW:** “FastLane will not permit submission of the proposal” if the text boxes are incomplete or a project summary has not been uploaded.
3. Table of Contents

• Automatically generated by the system (cannot be edited)
3. Project Description

• 15 pages
• Must address reviewers questions:
  1. What is it about?
  2. How will you do it?
  3. Can you do it?
  4. Is it worth doing?
• Be sure to include intellectual merit and broader impact statements in the body of the proposal (no Fastlane box to remind you)
• Don’t use URLs providing information related to the proposal
Suggested Components of an NSF Career Proposal Project Description:

- **Introduction**
  - Research Plan
  - Goals & Objectives
  - Background and significance
  - Preliminary supporting data
  - Methods and procedures
  - Expected significance of results

- **Education Plan**
  - Specific objectives
  - Proposed activities
  - Integration into research plan

- **Results of Prior NSF support (if applicable)**

- **Project Management**
  - Personnel & organizational structure
  - Planned collaborations
  - Project implementation schedule

- **Assessment**
  - Criteria for assessing that the goals and objectives of the research plan are met
  - Describe how the impact of the educational activities will be assessed or evaluated.
Some Bibliographic Resources for Educational Activities*

http://www.nap.edu/catalog.php?record_id=12190

http://www.nap.edu/catalog.php?record_id=12614

National Research Council (2011) *The Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering, and Mathematics*
http://www.nap.edu/catalog.php?record_id=13158

* From presentations by NSF Program Officers
5. Biographical Sketch

• NSF format: Section II.C.f(i) – Biographical Sketches format (2 pages)
  http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_2.jsp#IIC2f
  – Follow instructions to the letter
  – Publications: if unpublished, include most likely date of publication; no invited lectures to be included
  – FYI: non compliant biosketches have been a reason for “Return Without Review”

• NEW: The “Publications” section of the biosketch has been renamed “Products” (may include, but not limited to: publications, data sets, software, patents, and copyrights)
4. References

- No page limitation (cannot be used to circumvent 15-page project description)
- Include both research and education citations
- Uploaded separately
- Websites may be included in references cited but not in the narrative of the proposal
- May use standard format for each discipline
6. Budget and Justification

- GPG for general information on allowable costs
- Typically covers PI’s salary for 1 or 2 summer months and a graduate student (no major equipment)
- Voluntary committed cost-sharing is not allowed
- Support of OTHER SENIOR PERSONNEL is prohibited
- Include F&A (51%)
- Budget justification (no more than 3 pages)
- Budget should align with and support your research & education plans
- Contact your departmental research administrator
7. Current & Pending Support

- All external funding or pending proposals (no expired awards) including “This proposal: CAREER:.....” from whatever sources must be listed
8. Facilities/Equipment/Other Resources

• No page limit but describe only resources that are directly applicable. If there are no “Facilities, Equipment and Other Resources to describe, a statement to that effect should be included in this section and uploaded into FastLane.

• Include aggregated description of the internal and external resources (physical & personnel) that the organization and/or collaborators will provide to the project, should it be funded. Such information must be provided in this section, in lieu of other parts of the proposal (e.g., budget justification, project description).

• The description should be narrative in nature and must not include any quantifiable financial information.

• Reviewers will evaluate information during the merit review process and the NSF PO will review it for programmatic and technical sufficiency.
9. Departmental Letter

• No more than 2 pages (if PI has joint appointment, letter should be from the department granting tenure). Proposal cannot be submitted without this document

• Must include the departmental head’s name and title below the signature

• An indication that the PI’s proposed CAREER research and education activities are supported by and integrated into the educational research goals of the department and the organization

• A description of:
  a) the relationship between the CAREER project, the PI’s career goals and job responsibilities, and the goals of his/her department/organization, and
  b) the ways in which the department head will ensure the appropriate mentoring of the PI, the context of the PI’s career development and his/her efforts to integrate research and education throughout the period of the award and beyond

• A statement to the effect that the PI is eligible for the CAREER program
10. Letters of Collaboration

- 1 page max
- Letter of collaboration: e.g., “I will provide the PI with .....”
- No recommendation letters e.g., “this research project is a great idea....”
- No multiple identical letters
- No letters from previous proposals
- Do NOT send originals to NSF!
11. Data Management Plan

1. The type of data, samples, physical collections, software, curriculum materials and other materials to be produced during the course of the project.
2. The standards to be used for data and metadata format and content.
3. Policies for access and share including provisions for appropriate protection of privacy, confidentiality and security, intellectual property or other rights or requirements.
4. Policies and provisions for re-use, re-distribution and production of derivatives.
5. Plans for archiving data, samples and other research products, and for preservation of access to them.

Data management requirements and plans specific to the Directorate, Office, Division, Program, or other NSF unit, relevant to a proposal are available at:

If guidance specific to the program is not available, the requirements in the Data Management Plan of the NSF GPG apply.
12. Postdoctoral Researcher Mentoring Plan:

- Required if postdoctoral fellow on budget (max 1 page)
- Evaluated as part of the merit review process under NSF’s broader impacts merit review criterion.
- Do not use to circumvent 15 page project description limitation
- Mentoring Activities: career counseling; training on grantsmanship, publications and presentations; guidance on how to effectively collaborate with researchers from diverse backgrounds and disciplinary areas; and training in responsible conduct of research.

NB: absence of mentoring plan will cause proposal to be “returned without review”
NSF Proposal Review Process

Proposal Receipt at NSF

PHASE I
90 Days

Proposal Preparation
4/12/2013

Proposal Receipt to Division Director Concurrence of Program Officer Recommendation

PHASE II
6 Months

Program Officer Analysis & Recommendation

Minimum Reviews Required = 3

Ad Hoc (electronic)

Panel (primary & secondary)

Both

DD Concur

PHASE III
30 Days

Award

Division Director Concurs

Decline

Award Via Div. of Grants & Agreements

Organization

PI working on proposal

Organization submits via Fastlane on behalf of Faculty Member

NSF Proposal Processing Unit

NSF Program Officer

Returned Without Review/Withdrawn
NSF’s Review Process

• Your proposal will be judged by experts in fields related to the proposals under review not all experts in your specific area
  – Ad Hoc reviewers
  – Review Panel
  – Combination

• Reviewers want to know:
  1. What is it about?
  2. How will you do it?
  3. Can you do it?
  4. Is it worth doing?
Review Criteria

• What is the intellectual merit of the proposed activity?
• What are the broader impacts of the proposed activity?
• Integration of research and education
• Integrating diversity into NSF programs, projects and activities
Broader Impacts
Merit Review 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.

December 14, 2011
Final Report: Recommendations

1. Three guiding review principles
2. Two review criteria
3. Five review elements
Merit Review Criteria Guiding Principles

- 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.
- 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.
Five Review Elements

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 institution to conduct the proposed activities?

5. Are there adequate resources available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?
Promoting Teaching, Training and Learning

- Integrate research activities into STEM teaching of science, math and engineering
- Include students as participants in the proposed research
- Recruitment, training, professional development of K-12 STEM teachers
- Develop educational materials or contribute to databases useful in teaching
- Partner with researchers and educators to develop effective means of incorporating research into education
- Encourage student participation at conferences
- Establish special mentoring programs for students conducting research
- Involve graduate researchers in undergraduate teaching activities
- Develop, adopt, adapt or disseminate effective models and pedagogic approaches to STEM teaching.
Broaden Participation of Underrepresented Groups

- Establish collaborations with members of underrepresented groups
- Include students from underrepresented groups as participants
- Establish collaborations with non-Ph.D.-granting institutions and those serving underrepresented groups
- Visit institutions that serve underrepresented groups
- Establish collaborations at community colleges, colleges for women, undergraduate institutions, EPSCoR institutions
- Mentor early-career scientists and engineers from underrepresented groups who are submitting NSF proposals
- Participate in developing new approaches (e.g., use of information technology and connectivity) to engage underserved individuals, groups, and communities in science and engineering
- Participate in conferences, workshops and field activities where diversity is a priority
Enhance Infrastructure for Research and Education

- Identify and establish collaborations between disciplines and U.S. academic institutions, industry and government, international partners
- Stimulate and support the development and dissemination of next-generation instrumentation, multi-user facilities, and other shared platforms
- Maintain, operate and modernize shared infrastructure: science and technology centers, engineering research centers
- Upgrade the computation and computing infrastructure, including advanced computing resources and new types of information tools (large databases, networks and associated systems, and digital libraries)
- Develop activities that ensure that multi-user facilities are sites of research and mentoring for large numbers of science and engineering students.
Broad Dissemination to Enhance Understanding

- Partner with museums, nature centers, science centers, etc. to develop exhibits
- Involve the public or industry, where possible, in research and education activities
- Give presentations to the broader community (museums and libraries, on radio shows, etc.)
- Make data available in a timely manner by means of databases, digital libraries, or other venues such as CD-ROMs

Publish in diverse media (non-technical literature, websites, popular press) to reach broad audiences

Present results in formats useful to policy-makers, members of Congress, industry, and broad audiences

Participate in multi- and interdisciplinary conferences, workshops, and research activities

Integrate research with education activities in order to communicate in a broader context
Benefits to Society

- Demonstrate linkage between discovery and societal benefit by providing specific examples and explanations regarding potential application of results

- Partner with academic scientists, staff at federal agencies and with the private sector on both technological and scientific projects to integrate research into broader programs and activities of national interest

- Analyze, interpret, and synthesize research and education results in formats understandable and useful for non-scientists

- Provide information for policy formulation by Federal, State or local agencies
Merit Review Criteria
For Proposers

- Project Summary components will be required text boxes in FastLane not to exceed 4,600 characters and will include
  - Overview
  - Statement on Intellectual Merit
  - Statement on Broader Impacts

- Proposals with special characters may upload Project Summary as a PDF document

- Text boxes must be filled out or a project summary must be uploaded or FastLane will not accept the proposal.
Campus Resources

- Pentacrest Museums
- Iowa Initiative for Sustainable Communities
- Iowa Center for Research by Undergraduates (ICRU)
- Stem Hub
- Chief Diversity Office
- Iowa Flood Center
NSF Merit Review Website

www.nsf.gov/bfa/dias/policy/merit_review/
The Pentacrest Museums may be able to help you with the Broader Impacts (BI) portion of your project.
Rebecca Whitaker,
Regional Manager
Southeast Iowa STEM Regional hub

SE Iowa STEM Regional Hub
CAREER Awardees

Gregory Howes,  
Associate Professor,  
Physics & Astronomy

Raghu Mudumbai,  
Assistant Professor, Electrical and Computer Engineering

Christopher Cheatum,  
Associate Professor, Chemistry

Ann Campbell,  
Associate Professor, Management Sciences
Advice for NSF CAREER Proposals

1. Volunteer for an NSF proposal review panel
2. Get to know your program officer
3. Write the proposal with likely reviewer pool in mind
4. Format the proposal so it is easy to review
   - Find out review guidelines for your program
5. Get senior colleagues to read through your proposal

Greg Howes, Associate Professor, Physics & Astronomy
Kevin Leicht
Professor and Departmental Chair of Sociology, and Director of the Iowa Social Science Research Center

Johna Leddy,
Associate Professor, Chemistry

Donald Anderson,
Associate Professor, Orthopaedics and Rehabilitation, Biomedical Engineering
Comments for CAREER Discussion

12 April 2013
1117 UCC
Johna-leddy@uiowa.edu
chemistry
Leddy’s Experience with NSF

• Served on a CAREER Review Panel for NSF in Analytical Chemistry
• Have served on other review panels for NSF (and NIH)
• Reviewed proposals electronically for NSF
• Important discovery: Program manager wants to buy the very best science.
Support your PM.
Process for the Reviewer on the Panel

- Received electronic access to all the proposals before the panel (~25 proposals)
- Specifically assigned about 6 proposals for more detailed review, half as lead and half as recorder; reviewed in advance of meeting
- Panelists descend on NSF HQ early one morning (~8 panelists)
During Panel Review

- Panelists discuss the individual proposals. Lead reviewer guides the discussion & recorder types. Discussion is about 10 minutes per proposal. (Panelists at little individual tables)

- Panelists then go into session where they are asked to sort and then rank the proposals (Big tables)
  - Triage out poor and scientifically flawed proposals
  - Segregate remaining proposals into a middle and top group
  - Recommend for funding or not; rank the top proposals
  - Essentially, asked to identify any outstanding proposals that really deserve funding
Panelist’s Perspective

• From panelist’s perspective, little different than reviewing regular proposals to NSF
• Still satisfy review criteria:
  – Intellectual Merit
  – Broader Impacts

• So it is about writing a great proposal…
How to write a great proposal:
Best word of wisdom for proposal writing

“Concise and Compelling”

“When I review a proposal, I read the first two pages. At the end of the first two pages, I have decided if the idea warrants funding. If sufficiently attractive idea to fund, the PI has the remaining pages to convince me my initial assessment is wrong.”
Clues to Write a Great Proposal

1. What is the canvas area? (NSF: 15 pages)
   Map It!
   a. First two pages to make the case
   b. Remaining 13 pages:
      1. Introduction
      2. Proposed solution / idea
         1. Argument to why it will work
         2. Preliminary data
      3. Specific plan
      4. Objectives
      5. Broader Impacts
Clues to Write a Great Proposal

2. First 2 pages:
   ► Make your case.
   ► Make it imperative.

(40 % of your time, most of it polishing)

If you have preliminary data, put single most impressive plot/result bottom of first page

paragraph 1: what is known?

paragraph 2: what is the question?

paragraph 3: what is the approach? (fundamentally)?

paragraph 4: “Here, we propose…”
Clues to Write a Great Proposal

2. First 2 pages:
   ► Make your case.
   ► Make it imperative.

If it is transformative, say it here. Use the word *transformative*.

Add diagram or two
Keep it clean.
Make it interesting.
Sell the concept.

(40 % of your time, most of it polishing)
Lots of white space

Top page: Importance of the problem

Middle page: Specific and Broad Objective (Bullet list)

Bottom page: Summary including statement of intellectual merits and broader impacts (bullet list?)
Clues to Write a Great Proposal

3. Remaining 13 pages:
   1. Introduction (~2 pages)
   2. Proposed solution / idea (~4 to 5 pages)
      1. Argument to why it will work
      2. Preliminary data
   3. Specific plan (~3 to 4 pages)
   4. Objectives and restatement of why this proposal (~1 page)
      • Intellectual Merit
      • Broader Impacts
   5. Broader Impacts (< 2 pages)
Document Format and Style: Low Level

• Make it interesting.
• Sell the idea.
• Precision of Presentation → Precision of Thought
• Active Voice – dynamic thought, propel the reviewer *(If PI is not excited,…)*
• Remove excess words (in order to…, parentheticals)
• Figures, tables, and captions are important
• White space
• Grammar
• Equations ? (Where does the idea come from and is the PI equipped to evaluate it?)
• Get someone to proof the science and the grammar.
Because the Reviewers Know…

When you care enough to send the very best.

Your