NSF CAREER Program Development

Clemson University
College of Engineering and Science
CAREER Award - Speakers

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CAREER Award

- Funds the academic career development of new faculty (not a research award)

- Based on a development plan “a well argued and specific proposal for activities over a five year period, build a firm foundation for a lifetime of contributions in research and education”

- Duration: 5 years

- Minimum grant size $400K/Minimize grant sized in BIO/OPP $500K

- Restriction on the content in letters of collaboration: 1 page max.

- Details on international/global dimensions and cross-disciplinary activities

Some of the slides shown here were taken from a presentation by Dr. George Hazelrigg (Deputy Director, CMMI) at a CAREER proposal writing workshop
CAREER Award

• CAREER Research involves a career path, not a research project

• What are your research and educational objectives? This directs your proposal to the appropriate program

• What is your approach? Outline of a few sentences

• What is the specific research contribution you will make to the knowledge base (Intellectual Merit) Probably the single most critical part of the proposal!

• Broader impact to society (Broader Impact)
CAREER Award

- Most CAREER proposals are derived from doctoral or postdoctoral research effort. Some postdoctoral mentors forbid transfer of projects.

- Define a problem that provides the foundation for a longer term effort (that is, your CAREER).

- Confirmatory efforts that break little new ground should be avoided

- Transformative Research
CAREER Award vs. Regular NSF

SIMILARITIES
• Important, novel and interesting science
• Clarity, quickly make your point with visuals and organization
• Peer reviews and examples

DIFFERENCES
• More space to BI
• Research and BI plans integrated into a parallel structure
  ✓ After the introduction, summarize the research and education plan, followed by parallel “details of research plan” and details of education” plan
  ✓ Include work plan, education and research integration timeline section
The most important statement is your statement of your proposed objectives

- It should be at the very beginning
- Do not begin with a weather report: “The sky is falling. Pollution is everywhere. Jobs are moving offshore…”
- Do not begin with a state-of-the-union address: “It is imperative that the nation develop a strong blah, blah, blah…”

- Remember, this is not a tech paper, it is not a murder mystery (where we find out what the objective is on page 15)

- New Fastlane System more suitable
Project Summary

- First paragraph
  ✓ My long-term research goal is...
  ✓ In pursuit of this goal, the research objective of this CAREER proposal is...
  ✓ The research approach is...

- Second paragraph
  ✓ My long-term educational goal is...
  ✓ In pursuit of this goal, the educational objective of this CAREER proposal is...
  ✓ The educational approach is...

- Anything else will lower your rating
Four options to do it right

✓ The research objective of this proposal is to test the hypothesis $H$

✓ The research objective of this proposal is to measure parameter $P$ with accuracy $A$

✓ The research objective of this proposal is to prove conjecture $C$

✓ The research objective of this proposal is to apply method $M$ from field $Q$ to problem $X$ in field $R$. 

Must be testable so you can write a plan
Project Summary

Do not use words that do not mean research

- Develop
- Design
- Optimize
- Control
- Manage

Using these words gives the impression that you are not doing research, there is no innovation and nothing is new. Ratings will be lower.

Must be testable so you can write a plan
My long-term research goal is... In pursuit of this goal, the research objective of this CAREER proposal is to test the hypothesis that the propensity of a tree to break is directly proportional to the number of monkeys in the tree. The approach will be to take a sample of ten trees and load them with monkeys until they break...

My long-term educational goal is... In pursuit of this goal, the education objectives of this CAREER proposal are... The approach to accomplishing these objectives will be...

**Intellectual Merit** - It is important that we know how many monkeys can climb a tree before it breaks because this affects our perceptions of monkey procreation and... The Snerd Theory holds that tree size limits monkey procreation. This study challenges that theory with the notion that... If the objective hypothesis is correct therefore, it will transform our approach to...

**Broader Impact** - Monkeys are used in medical research. By knowing how many monkeys can fit in a tree, we will be able to provide more monkeys for such research thereby advancing medical science more quickly and improving the quality of life. Also, by watching the monkeys get hurt when the tree breaks, graduate students will be less likely to climb trees, thereby increasing their probability of graduating.
Tips for a Strong Broader Impact

• Play to your strengths and existing opportunities (e.g. teaching, outreach, stakeholders, etc.)

• Graduate students are great facilitators of broader impacts (e.g. outreach: you receive help, they receive training)

• PEER/WISE Contacts – Sue Lasser/Serita Acker

• Seek partnerships for surveys: OTEI or faculty specializing in such research
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 PI's organization.

May not exceed 15 pages:

- Description of the proposed research project (preliminary supporting data where appropriate, specific objectives, methods and procedures, and expected significance of results (60%))

- Description of the proposed educational activities, including plans to evaluate their impact on students and other participants (40%)

- Description of integration of research/educational activities

- Results of prior NSF support, if applicable.
Project Summary

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Must be testable so you can write a plan
Project Description

- Start with a restatement of your goals and objectives, clarify them, and provide a plan to accomplish them

  ✓ Task statements should actually detail the tasks needed to accomplish your objectives

- Restate and provide detail on your intellectual merit and broader impact (separate section now)
Project Description – Research Plan

General Introduction

List of (Experimental) Objectives

Objective 1: ----------------------------

I. Hypothesis

II. Background & Rationale (include preliminary data)

III. Methods & Procedures

IV. Anticipated Outcomes

V. Potential Pitfalls and Problems
Project Description – Educational Plan

- Teaching philosophy
- Components
- Learning goals
- Assessment
- Innovation
- Integration of the research and teaching plans

Section that specifically addresses criterion 2 issues; examples
- Undergraduate, graduate and postdoctoral training
- Creation of research resources
- Establishment of unique collaborations
- Public outreach

Include a realistic timeline
Project Description – Educational Plan

Teaching philosophy

• Teaching “Credo”- your beliefs about teaching and learning
• Why do you teach the way you do?
• What methods do you use to integrate research and teaching?
• How do you know you are being effective?
A final point....

Proof of concept is critical

- Can be prior published work or preliminary data

- Demonstrates the feasibility of the project and that have the ability to do this work

- Avoid presenting too much data
Additional Documents

- Departmental Letter
- Letters of Collaboration
- Postdoctoral Researcher Mentoring Plan
- Data Management Plan
- References Cited
- Biographical Sketch of Principal Investigator
- Supplementary Documentation
Department Letter

**No more than 2 pages in length** - include the name and chair of dept. head below the signature.

- Indicate your CAREER research and education activities are supported/integrated into the educational/research goals of your dept. and Clemson and that you have support for professional development

- Describe the relationship between the CAREER project, career goals and job responsibilities, and that of your department and COES

- Describe how the dept. chair will ensure your mentoring in career development to integrate research and education throughout the period of the award and beyond

- State your eligibility for the CAREER program
Contact the Program Officer

Prepare a brief quarter-page research summary

Read the CAREER guideline

Questions to ask
• Does your research fit the program?
• What are the common shortcomings/problems the program officer has seen in proposals?
• Are there things PI should include or address in a proposal to help get it funded?
• How are CAREER proposals reviewed?

Questions not to ask
• Is this a good research topic?
• Recommendations for Co-PI?
• Will you review my proposal before submission?
• What are my odds?
• This is my last chance, what can I do?
Unsuccessful Proposals

• Poorly articulated problem
• Incremental research without a fresh perspective
• Failure to identify goals and plan of attack
• Too many unrelated tasks
• Lack of innovation; proposed effort is similar to your prior published work
Unsuccessful Proposals

• Lack of compelling evidence that your plan will succeed

• Important within a narrow subfield, but does not make a convincing case that the work is important in a broader context

• Education plan is uninspiring and lacks assessment mechanism(s)

• Poor page space planning (should be a 40/60 split – education vs. research plan)

• Missing timeline
CAREER Resources

• Successful CAREER proposals
  ✓ http://serc.carleton.edu/NAGTWorkshops/earlycareer/research/NSFgrants.html

• 5 funded CAREER proposals related to Geosciences
  ✓ http://valis.cs.uiuc.edu/~sariel/papers/01/career/career.pdf
  ✓ http://www.math.uic.edu/~bshipley/career.education.pdf

• Other CAREER Resources
  ✓ http://www.oakland.edu/upload/docs/Research/CAREER%20Webinar%20Handout%20Package%202012.pdf