# NSF CAREER

Sally Bond & Sue Grimes
Research Development Services
February 5, 2019

## Overview of this workshop

- CAREER nuances
- Understanding NSF directorates and determining which best fits your proposal
- Helpful resources
- CAREER proposal preparation

## About Sessions 2 & 3

- Targeting those who plan to submit July 2019
- Ideally, in 2nd year or more of appointment
- Session 2 – March 4, 1:00-2:30 PM
  - Focus on concept paper
- Session 3 – March 20, 1:00-2:30 PM
  - Focus on Broader impacts and education integration

## Nuances for NSF CAREER

- Emphasis is on career development
  - Strategic plan for the future – 5, 10, 20 years from now
  - Research and Education
  - Must fit with institutional goals (Support from Dept Chair)
- Funding levels ($400k/$500k) are minimum – not maximum
- Supplemental funding Possible* (REU, Career-Life Balance, Europe/Germany)

* Discuss with your Program Officer first

## ALLOWABLE EXPENSES

- SALARY SUPPORT ONLY FOR PI AS SENIOR PERSONNEL
  - AY (SUMMER SALARY) ONLY IF CAN STRONGLY JUSTIFY AND TALK WITH PO FIRST
- CAN INCLUDE FUNDS FOR POSTDOCS, GRAD STUDENTS, UNDERGRADS, SUMMER SALARY, EDUCATION & OUTREACH ACTIVITIES, TRAVEL, EVALUATORS, AND CONSULTANTS
- *ADDITIONAL* FUNDING AVAILABLE FOR EQUIPMENT/ INSTRUMENTATION (SEE PAPPG - PG II-17)
- INCLUDE F&A

## BEST TIME TO SUBMIT

- AFTER 1ST YEAR (BUT NOT AN NSF REQUIREMENT)
- CAN HAVE OTHER NSF FUNDING
- ~1/3 OF AWARDEES DON'T HAVE ANY PREVIOUS NSF FUNDING

# HELPFUL RESOURCES

## NSF CAREER PROGRAM RESOURCES

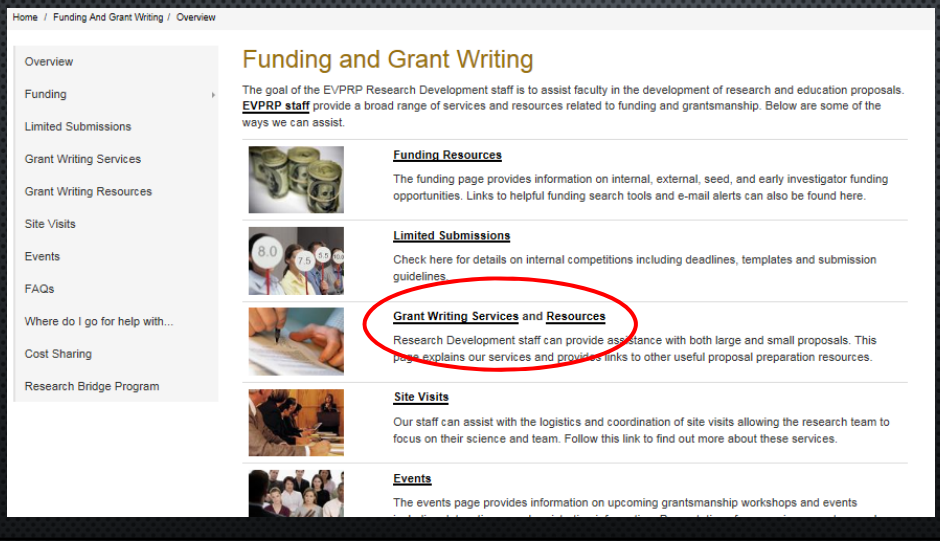
- https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214
  - SOLICITATION
  - FAQS
  - WEBINAR/PRESENTATION
  - CONTACTS
  - AWARDS

## MOCK REVIEW CAREER PANEL

- http://www.nsf.gov/eng/cbet/multimedia/webinar.jsp

# RESEARCH DEVELOPMENT SERVICES

https://www.purdue.edu/research/funding-and-grant-writing/overview.php



## Purdue e-Pubs

Home > OVPR > GENDES

UNIVERSITY GENERAL FACILITY BOILERPLATE DESCRIPTIONS

Purdue General Facilities are part of the institutional infrastructure of the University and are available to faculty and staff.

This series contains descriptions of the Purdue General facilities and includes institutional-level summaries as well as text on specific areas and resources on campus that may need to be described in proposals submitted to funding agencies. These descriptions provide citable text for inclusion – either in its entirety or of pertinent portions – in proposals submitted to funding agencies. These descriptions are searchable by keyword and include recommended citations that will prevent your proposal from being flagged for plagiarism.

Follow

File Birck Nanotechnology Center Technical Overview, John R. Weaver and Purdue University Office of Research and Partnerships

File Business and Financial Management and Audit Control for Large Research Proposals, Purdue University Office of Research and Partnerships

File Discovery Park General Facilities Description, Candiss Vibbert and Purdue University Office of Research and Partnerships

## Broader Impacts Resources

All NSF proposals must include a section within the Project Description that discusses the broader impacts of the proposed activities. The resources below may be helpful in completing this requirement.

- **National Alliance for Broader Impacts (NABI)** Check out this NSF-funded network for developing more innovative and compelling broader impact activities.
  - ***NABI Broader Impacts Guiding Principles and Questions for NSF Proposals*** The purpose of this document is to assist NSF program managers, proposal reviewers, and review panels in evaluating the BI component of NSF proposals and to assist proposers with developing their broader impact plans.
- **Virtual Rolodex of Potential Education and Outreach Partners** Proposal-focused information on campus resources you can leverage for broad impacts.
- **Steps to Leveraging Campus Resources for Broader Impacts** This figure walks you through best practices for incorporating broader impacts in your research proposal.
- **NSF Merit Review** Information on NSF's Merit Review Process, including FAQs.
- **Center for Ocean Sciences Education Excellence's *Broader Impacts 2.0*** This excellent document from COSEE helps to clarify the broader impacts criterion and provides practical tips for addressing broader impacts in your proposal.

## Data Management Plans

All NSF proposals must include a supplementary document labeled "Data Management Plan" that describes how results from NSF funded research will be shared with other researchers. The resources below may be helpful in completing this requirement.

- **Purdue's Research Repository (PURR)** - this site contains step-by-step instructions for completing the data management plan requirements. The website also offers **citable boilerplate text** that can be inserted into the DMP.
- **Data Storage Options at Purdue** - this site explains different data storage options available to the Purdue community
- **HUBzero™** - this resource is available to Purdue researchers for storing research data. The website also offers **citable boilerplate text** that can be inserted into the DMP.
- **NSF Data Management Plan (DMP)** Includes NSF Data Sharing Policy, DMP Requirements by Directorate, Office, Division, Program or Unit; and DMP and Sharing FAQs.
- **Sample DMP Content Outline**
- **Generic Example of a DMP**
- **Self-Assessment Document** to guide faculty through identifying issues that should be reflected in the DMP.

## NOT SUCCESSFUL?

- YOU CAN SUBMIT TO CAREER UP TO THREE TIMES
- SUBSEQUENT SUBMISSIONS HAVE A BETTER CHANCE OF BEING FUNDED
- GET REVIEWS, CAREFULLY CONSIDER THE COMMENTS, AND MAKE APPROPRIATE REVISIONS
- MAKE REVISIONS WHILE INFORMATION IS STILL FRESH IN YOUR MIND
- ASK OTHERS TO REVIEW YOUR PROPOSAL

# FINDING THE RIGHT DIRECTORATE FOR YOUR PROPOSAL

## NSF DIRECTORATES

- Biological Sciences (Bio)
- Computer & Information Science and Engineering (Cise)
- Education & Human Resources (Ehr)
- Engineering (Eng)
- Geosciences (Geo)
- Mathematical & Physical Sciences (Mps)
- Social, Behavioral & Economic Sciences (Sbe)

- Program officer names by Directorate/Division
  - https://www.nsf.gov/crssprgm/career/contacts.jsp

## Contacts

**DIRECTORATE FOR BIOLOGICAL SCIENCES (BIO)**

**Directorate Contacts:**
Engin Serpersu: 703-292-7124

**Division of Environmental Biology (DEB):** 703-292-8480
Chris Schneider: 703-292-7920

**Division of Integrative Organismal Systems (IOS):** 703-292-8420
Michael Mishkind: (703) 292-8413

**Division of Molecular and Cellular Biosciences (MCB):** 703-292-8440
Engin Serpersu: 703-292-7124

**Division of Biological Infrastructure (DBI):** 703-292-8470
Peter McCartney: 703-292-8470

**DIRECTORATE FOR COMPUTER & INFORMATION SCIENCE AND ENGINEERING (CISE)**

**Directorate Contacts:**
Almadena Chtchelkanova: 703-292-8910
Sushil Prasad: 703-292-5059

**Office of Advanced Cyberinfrastructure (OAC):** 703-292-8970
Sushil Prasad: 703-292-5059

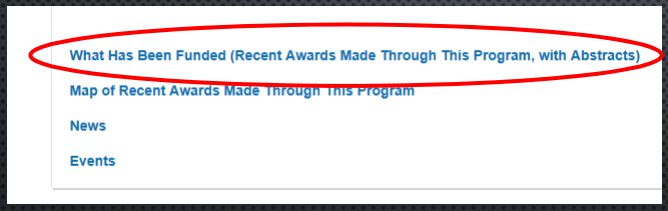
**Division of Computing & Communication Foundations (CCF):** 703-292-8910
Almadena Chtchelkanova: 703-292-8910

**Division of Computer & Network Systems (CNS):** 703-292-8950
Thyagarajan Nandagopal: 703-292-8950

**Division of Information and Intelligent Systems (IIS):** 703-292-8930
Ephraim P. Glinert: 703-292-8930

Review what has been previously funded

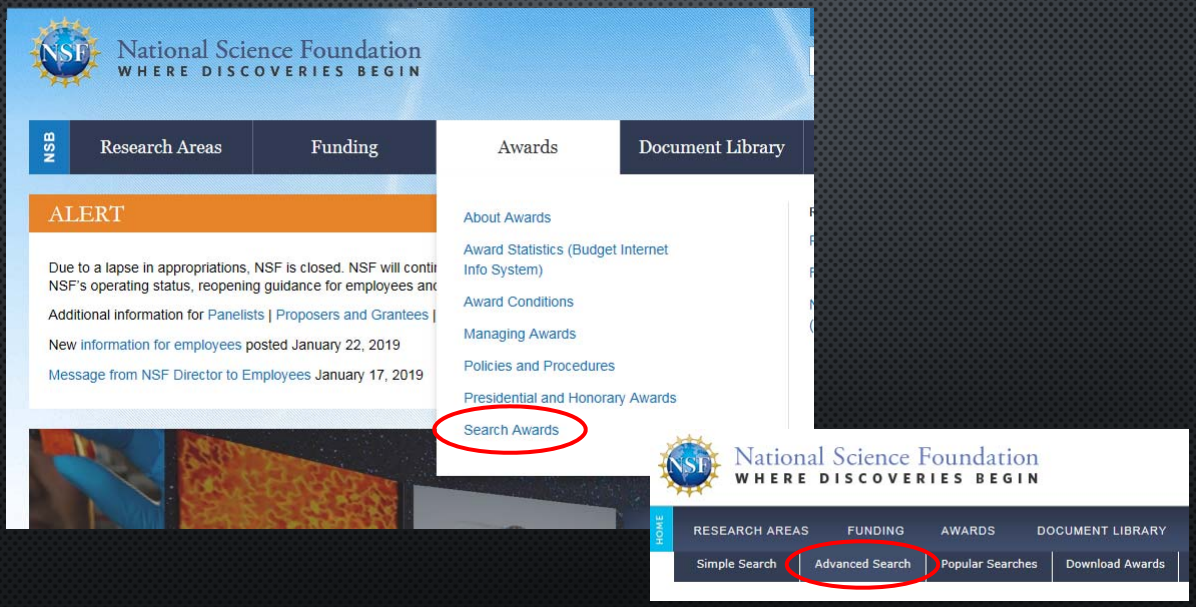
## SEARCH OPTION 1

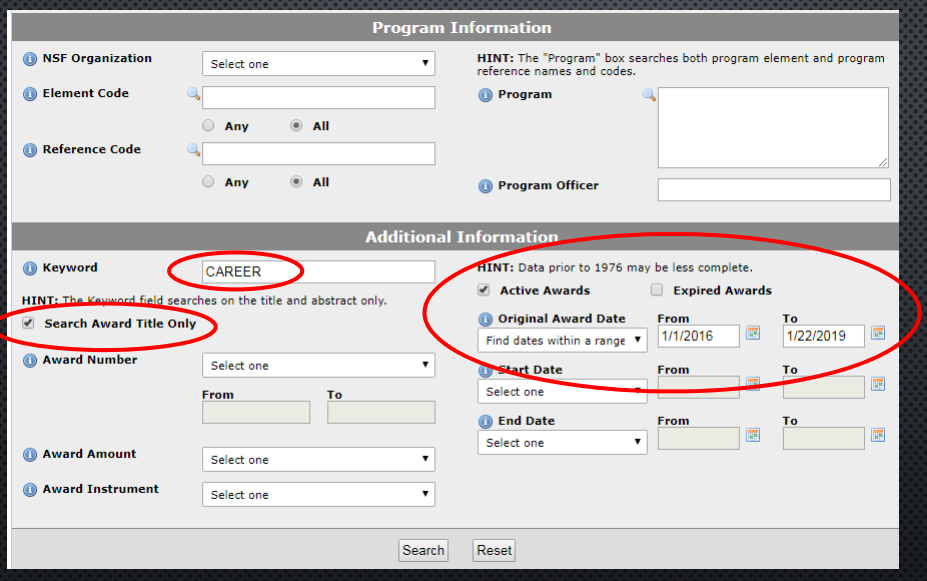



* Limited to 3,000 results so won't see all CAREER awards

# SEARCH OPTION 2

https://nsf.gov/awardsearch/advancedSearch.jsp




OR… Program = "CAREER: FACULTY EARLY CAR DEV"
OR… Element Code = "1045"

# QUESTIONS

# NSF CAREER Proposal Preparation

February 2019

Sally Bond
Assistant Director of Research Development Services
Proposal Coordination
Office of the Executive Vice President for Research and Partnerships

PURDUE UNIVERSITY

## Distinctives…Examples…Process

## What Makes a Good CAREER Proposal?

Not your typical NSF research proposal

- more "path" than project
- strategic fit with institution
- clearly transformative research direction
- creative and integrated education and research

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## Research Path Not Project

Funds academic career development of new faculty

….should contain a well-argued and specific proposal 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."

(Section V in CAREER solicitation)

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## Research Path Not Project

What is your strategic plan?


"All CAREER proposals should describe an integrated path that will lead to a successful career…" (section II in CAREER solicitation)

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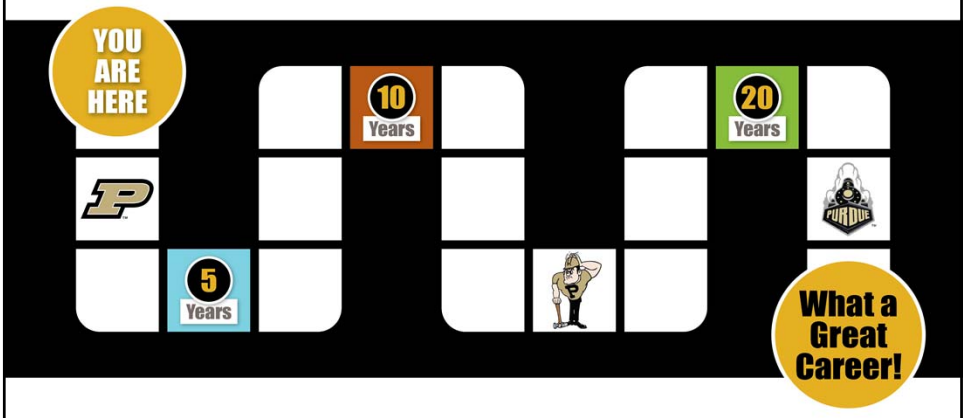
## Research Path Not Project

What is your strategic plan?




Where do you want to be in
5 years? 10 years? 20 years?

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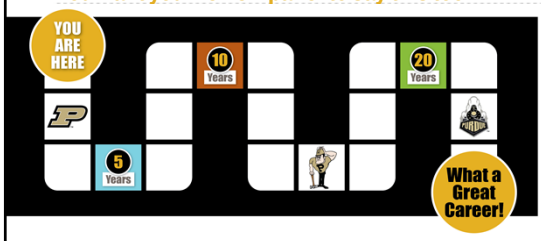
## Research Path Not Project

You want your review panel to say this too




…"*has made an excellent case for how the proposed research and education plan will help her achieve her personal career vision*."

Reviews from Senay Purzer, 2012 Purdue CAREER Awardee
Assistant Professor of Engineering Education

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Ask yourself blue sky questions…

- What problem do you feel passionate about?
- Where do you want to have a transformative impact?
- In what ways are you prepared to push the frontiers of knowledge?
- Where can you contribute to national needs and priorities?

## Clear Career and Research Goals

**1.3 Career objectives**

The long term career goal of the PI is to integrate excellence in the science and engineering of nano-structured semiconductor devices with education of future scientists and engineers. Achieving this goal will contribute significantly to the *fundamental knowledge about band, polarization, and strain engineering* of nitride nanostructures and will bring these materials to the level of maturity necessary for infrared commercial applications. The research plans detailed in this proposal naturally continue the PI's previous studies of infrared lasers, and current investigations of correlations between semiconductor structure and infrared optical properties. The proposed program will expand prior and ongoing work to a novel class of nanostructured devices, the nonpolar nitride infrared devices, devices that hold promise for new functionalities in the underdeveloped spectral regions of the infrared. By improving fundamental understanding of the physics and material science of nitride materials, this work will enable ultra-fast and versatile infrared light emitting and detecting devices that will ultimately enhance the performance and wide-acceptance of commercial infrared systems for spectroscopy, telecommunications, sensors, etc.

Oana Malis, 2013 Purdue CAREER Awardee
Assistant Professor of Physics

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## Vision and Impact

*The goal of my interdisciplinary research is to develop a robust and scalable computational framework for the emerging field of computational population biology. Ultimately, this research will enable biologists in their scientific inquiry to take advantage of new data by focusing on its underlying qualitative (rather than numerical) and explicitly dynamic structure.*

Tanya Berger-Wolf CAREER (Univ of Illinois, Chicago)

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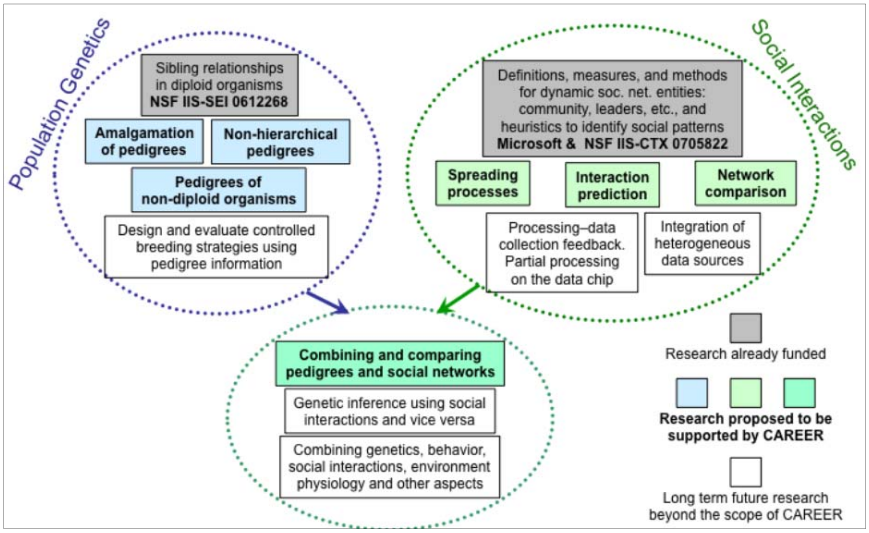
# Long-Term Pathway

**Be specific about what has been done, will be done, and will be done in future**




Tanya Berger-Wolf CAREER (Univ of Illinois, Chicago) 11

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Oana Malis, Purdue CAREER Awardee
Assistant Professor of Physics

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## Institutional Fit


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## Institutional Fit



PURDUE NEUROSCIENCE

## Transformative Research

Why is this work essential?

- Needs to be solved now?
- Says who?
- Facts and figures of cost to country/industry/communities
- What industries/communities will be positively impacted by your work?

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## Transformative Research

Why is this work essential?

- Needs to be solved now?
- Says who?
- Facts and fig
- ities
- ies/communities will be positively impacted by your work?

Cannot be incremental

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## Integrating Education and Research

## Integrating Education and Research

Integration is critical…cannot be an afterthought. Innovative but doable.

- What are you passionate about?
- Where do you have a track record to build on?
- Do not reinvent the wheel!
- Both "vanilla" and creative initiatives
- Sustainable
- Based on best practices

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**“Such activities should be consistent with research and best practices in curriculum, pedagogy, and evaluation.”**

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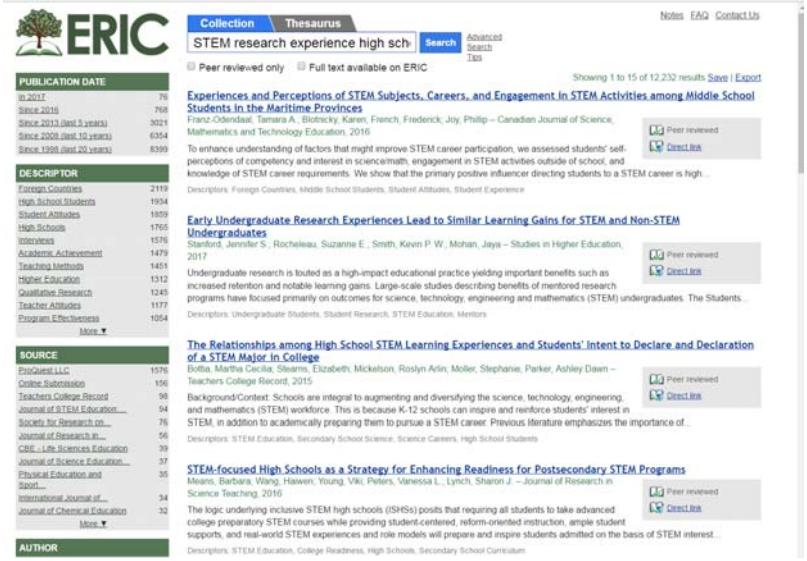
# Evidence-based Education

ERIC (Education Resource Information Center) https://eric.ed.gov

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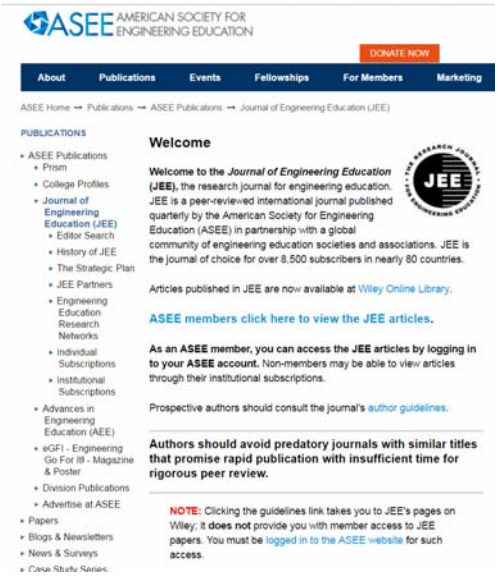
# Evidence-based Education

## ASEE Journal of Engineering Education

https://asee.org/papers-and-publications/publications/jee

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# Think Beyond Business as Usual

- Co-developed/cross-listed course
- Innovative undergraduate instruction
- K-12 teachers and students
- Outreach through summer camps
- Partnerships with museums and informal science learning organizations
  Citizen science and public STEM literacy
- Service learning
- Entrepreneurship (include I-Corps!)

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## Consider Diversity for Broader Impact

- How will you attract and mentor diverse students?
- Underserved rural areas, disabled, gender diversity, veterans
- Don't quantify
- Can involve teachers recruited from schools with particular demographics

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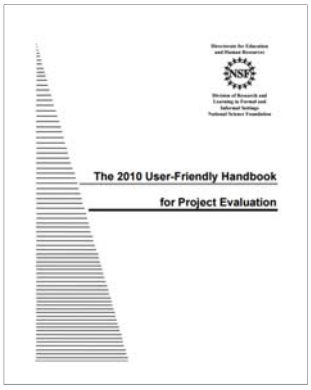
## Integrating Education and Research

You MUST assess educational initiatives

*W.K. Kellogg Foundation*
*Logic Model Development Guide*

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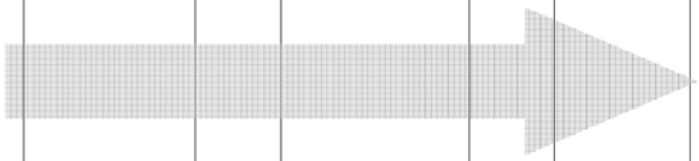
# Integrating Education and Research

Logic model helpful to develop even if not included in proposal

| For Whom | Assumptions (Theory of Change) *Moving from...* | Inputs | Strategies/Activities *through...* | Outputs | Outcomes *through...* | Impact |
|---|---|---|---|---|---|---|
| | | | | | | |



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# Integrating Education and Research

Consider an integrated advisory board. Need commitment letters.

**XI. PROJECT ADVISORY BOARD**

Members of my CAREER Advisory Board, listed below, are experts in engineering, cognitive psychology, and innovation education. The assessment review panel will formally meet five times during the project. I will also have on-one-one meetings with my advisors when necessary throughout the project. I have already had detailed meetings with each one of them as I prepared this proposal.

***Mary Besterfield-Sacre*** *(Associate Professor and Fulton C. Noss Faculty Fellow, Swanson School of Engineering, Industrial Engineering, University of Pittsburgh)*: Dr. Besterfield-Sacre's research expertise includes engineering education evaluation methodologies and quality improvement in manufacturing and service organizations. She is a renowned expert in assessment and evaluation in engineering education and for her research on innovation, which has been funded by the NSF and NCIIA.

***Nathalie Duval-Couetil*** *(Director, Certificate in Entrepreneurship and Innovation Program, Associate Director, Burton Morgan Center for Entrepreneurship)*: Dr. Duval-Couetil has launched and currently leads Purdue' university-wide multidisciplinary undergraduate entrepreneurship program. This program has involved over 2,000 students from all majors since 2005. She also leads initiatives on leadership education for women. Dr. Duval-Couetil also has experience in market research and business strategy consulting in Europe and the United States. She will contribute to this project in significant ways through her diverse expertise and by helping recruit student participants.

***Vincent Duffy*** (Associate Professor, Industrial Engineering and Agricultural and Biological Engineering,

Senay Purzer, 2012 Purdue CAREER Awardee
Assistant Professor of Engineering Education

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# Integrating Education and Research

## Use a unified schedule

| | Semester | Research Plan | Educational Plan |
|---|---|---|---|
| Year 1 | Spring' 12 | • Detailed planning of the data collection and data analysis<br>• Train graduate and undergraduate students in data collection & analysis.<br>• Pilot data collection in the ELO lab (complete 10 interviews & verbal protocols) | |
| | Summer' 12 | • Analyze pilot data<br>• Refine and finalize coding protocols<br>• Refine procedures for data preparation for analysis: editing, chunking, etc. | • Develop assessment tools, such as rubrics, for classroom use. |
| | Fall' 13 | • Contact engineering faculty to recruit additional participants<br>• Recruit student participants<br>• Start data collection | • Develop short course activities on innovation. |
| Year 2 | Spring' 13 | • Continue data collection (complete 75 interviews & verbal protocols with senior engineering students)<br>• Data preparation, editing, and coding. | • Develop an innovation-focused teacher professional development module for PBS Teacher Line |
| | Summer' 13 | • Data analysis (coding)<br>• Develop case studies<br>• Present findings at ASEE | • K-12 teacher professional development as part of SLED and INSPIRE |
| | Fall' 13 | • Present findings at FIE<br>• Data analysis (frequency calculations) | • Present findings at the industry advisory board |
| Year 3 | Spring' 14 | • Continue data collection (complete 75 interviews & verbal protocols with senior engineering students)<br>• Submit conference proposals on preliminary findings<br>• Present findings at NCIIA | • NCIIA faculty workshop<br>• Analyze pilot first-year engineering survey data |
| | Summer' 14 | • Data analysis (case studies)<br>• Submit a journal manuscript to JEE | • Develop a graduate course on innovation and research methods |

Senay Purzer, 2012 Purdue CAREER Awardee
Assistant Professor of Engineering Education

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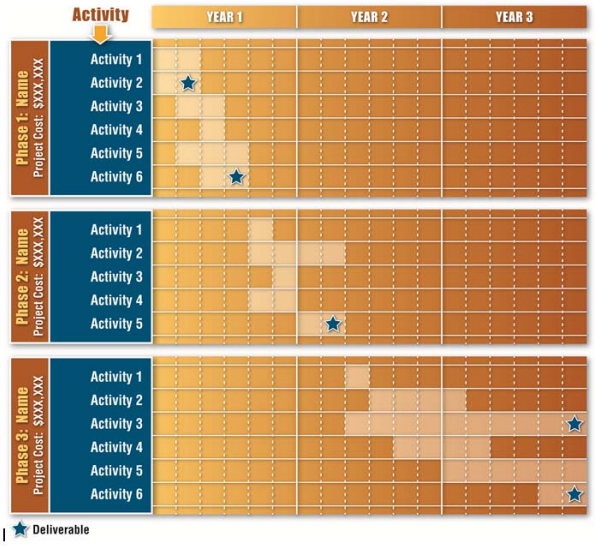
# Integrating Education and Research

## If interested, contact sbond@purdue.edu for help with timeline graphic

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# Plan of Action

## Proposal Preparation Timeline

**CAREER 2019 Proposal Preparation Timeline** * Red denotes must do this before writing any proposal text

| | Mon 2/11 | Mon 2/25 | Mon 3/18 | Mon 4/8 | Mon 4/22 | Mon 5/6 | Mon 5/20 | Mon 6/3 | Mon 6/10 | Mon 6/17 | Mon 6/24 | Mon 7/1 | Mon 7/8 | Fri 7/12 | Mon 7/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analysis and Planning** | | | | | | | | | | | | | | | |
| Read abstracts of funded CAREERS for directorate fit | | | | | | | | | | | | | | | |
| Notify Pre-Award Center for assigned specialist | | | | | | | | | | | | | | | |
| Storyline Development | | | | | | | | | | | | | | | |
| • What is the problem? | | | | | | | | | | | | | | | |
| • What has been done already to address this problem? | | | | | | | | | | | | | | | |
| • What is the gap that still remains? | | | | | | | | | | | | | | | |
| • How do you propose to address this gap? | | | | | | | | | | | | | | | |
| Map out long-term pathway and vision | | | | | | | | | | | | | | | |
| Research and education goals | | | | | | | | | | | | | | | |
| Identify win themes/discriminators | | | | | | | | | | | | | | | |
| **Program Officer Input** | | | | | | | | | | | | | | | |
| Draft concept paper for PO | | | | | | | | | | | | | | | |
| Concept paper reviewed internally | | | | | | | | | | | | | | | |
| Identify appropriate program / PO | | | | | | | | | | | | | | | |
| If international component, contact PO to discuss | | | | | | | | | | | | | | | |
| Email one-pager to PO; request appt | | | | | | | | | | | | | | | |
| Revise storyline based on PO feedback | | | | | | | | | | | | | | | |
| **Proposed Outline** | | | | | | | | | | | | | | | |
| Develop detailed outline | | | | | | | | | | | | | | | |
| Identify graphics needed | | | | | | | | | | | | | | | |
| **Partnerships** | | | | | | | | | | | | | | | |
| Recruit any collaborators, if needed | | | | | | | | | | | | | | | |
| Recruit advisory board members, if needed | | | | | | | | | | | | | | | |
| Identify assessment partner, if needed | | | | | | | | | | | | | | | |
| Collect letters of collaboration (TEMPLATE) | | | | | | | | | | | | | | | |
| Request department head about letter | | | | | | | | | | | | | | | |
| **Proposal Writing and Editing** | | | | | | | | | | | | | | | |
| Develop NSF bio to reflect research & education | | | | | | | | | | | | | | | |
| Use outline to write sections | | | | | | | | | | | | | | | |
| Edit | | | | | | | | | | | | | | | |
| Internal review of near final draft | | | | | | | | | | | | | | | |
| Revise based on review | | | | | | | | | | | | | | | |
| Write data management plan | | | | | | | | | | | | | | | |
| Complete Collaborators and Other Affiliations | | | | | | | | | | | | | | | |
| Write postdoc mentoring plan, if needed | | | | | | | | | | | | | | | |
| Write budget justification | | | | | | | | | | | | | | | |
| Write facilities document (use egrabr) | | | | | | | | | | | | | | | |
| Write one-page summary | | | | | | | | | | | | | | | |
| Final check of references | | | | | | | | | | | | | | | |
| Final budget justification, draft narrative to PreAward | | | | | | | | | | | | | | | |
| Submit all documents except narrative | | | | | | | | | | | | | | | |
| Submit project narrative | | | | | | | | | | | | | | | |

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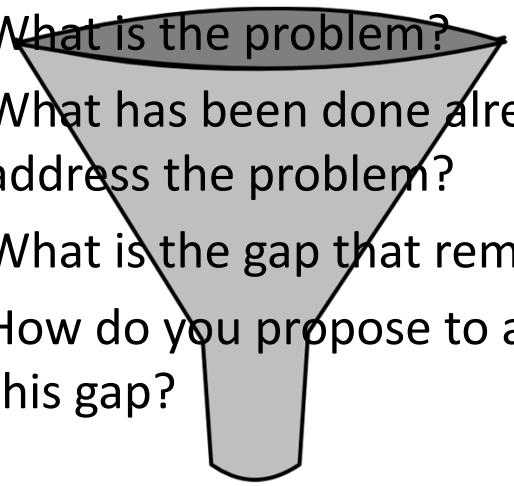
# Tell a Compelling Story

## Logic flow goes from broad to narrower



- What is the problem?
- What has been done already to address the problem?
- What is the gap that remains?
- How do you propose to address this gap?

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## Tell a Compelling Story

**Where? Very first part of your introduction.**

Despite the crucial link between engineering and innovation, research on engineering innovation education is limited. The challenge, however, is not the volume of studies on this topic but the integration and application of research. Prior studies conducted by cognitive scientists, design researchers, and business scholars highlight some of the individual characteristics important for creativity, characteristics of innovators and entrepreneurs, and the critical role of organizations in supporting innovation. However, very little is known about how engineering students approach innovation and ways to measure these processes and their outcomes. Hence, this study will examine engineering students' cognitions, motivations, and predispositions using interviews and think-aloud protocols. Their processes will then be analyzed to identify possible curricular, gender, and cultural differences among students. Senay Purzer, Assistant Professor of Engineering Education [31]

## Tell a Compelling Story

**Sets up the logical flow and significance for your proposal. Hooks reviewer.**

In 2013, 61% of raw energy (namely, coal, natural gas, and oil) was wasted as heat because of the low efficiency of power conversion. A thermophotovoltaic (TPV) system desirable for its low maintenance and quiet, portable operation can uniquely capture this waste heat as electricity by using thermal photons (discrete units or quanta of light) whose energies match the bandgap of the photovoltaic (PV) cell. However, TPV systems emit the vast majority of thermal photons at low energies, thus greatly reducing efficiencies. To overcome this barrier, we propose to develop a highly innovative approach to TPV, which we call thermo-photonics (TPX), by redirecting thermal photons into useful energies matching the PV cell. TPX can significantly increase the efficiency of TPV converters up to 50%. What is more, this device may efficiently utilize standard silicon PV technology, thus ensuring a relatively easy transfer to commercial development when the concept is proven.

Peter Bermel, Assistant Professor of Electrical and Computer Engineering, 2014 Purdue CAREER Awardee [32]

## Storyline is Basis for PO Discussion

Create a one-page brief

**One-page** concept paper includes:

- concise storyline
- career vision/integrative goals
- brief qualifications…why you?
- overview of methodology/approach
- impact and why this is novel

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## Contacting Your Program Officer

Do not make a 'cold call'

- Identify your program officer
- Contact PO(s) to request phone or in person conversation
- Include:
  - one-page concept paper
  - NSF-compliant biographical sketch

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## Know Reviewing Mechanism

| Ad hoc +/- Panel | Mostly Panel |
|---|---|
| GEO | ENG |
| BIO | CISE |
| SBE | HER |
| MPS: DHE, DMR | MPS: AST, DMS |

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## Questions to Ask Program Officer

Contact by middle of May at the latest. Get moving on that storyline!

Ask questions such as:

1. Does my research goal fit well with your program?
2. Is this the right scope? Do I need more preliminary data?
3. What is the typical award size?
4. What type of review? Ad Hoc or Panel?
5. What is preference for RET/REUs?

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# Outline before Writing

**Be kind to reviewers. Make your proposal easy to read. Format consistently.**

**Possible Outline for CAREER Project Description**

- Use "I" instead of "we" or "our" because this is about YOUR five-year career path. (However, one-page summary is required to be third person.)
- 15 pages for project narrative
- 1" margin
- Allowed fonts: Arial, Courier new, Palatino Linotype at 10points or larger; Times New Roman at 11point or larger.
- No urls allowed except in the references
- Avoid passive voice whenever possible
- Include quality graphics and figures with clear captions

**1. Significance and Rationale (~1 page)**

- Compelling storyline that excites your reviewers with the logic flow of:
  - What is the problem?
  - What has been done already to address this problem?
  - What is the gap that still remains?
  - How do you propose to address this gap?
- vision for how this will launch you into novel contributions in your career
  - you must be proposing novel work rather than incremental
- state both research and education goals
- concisely state what will be the impact on the field when you are successful with your proposed CAREER

**1.1 Intellectual Merit**

- state potential to advance

**1.2 Broader Impacts**

- Read NSF Grant Proposal Guide for instructions on this required section. How is your research benefiting society? In what ways are you broadening accessibility?
- Refer to Broader Impacts resources on Research Development website at: https://www.purdue.edu/research/vpr/rschdev/proposal_prep_resources.php
- Entrepreneurship activity?

**2. Approach**

- provide an overview of your overall approach to the research plan before you go into details on your plan
- if you have any collaborators, clearly explain their roles in the appropriate section
- if you will need special equipment or instruments, include text on how you will acquire these resources or gain access to existing ones

**2.1 Background**

- this is not a literature review for your dissertation. Cite key references strategically particularly in light of "what has been done already to address this problem?"
- can include your relevant preliminary studies within this section or have separate section

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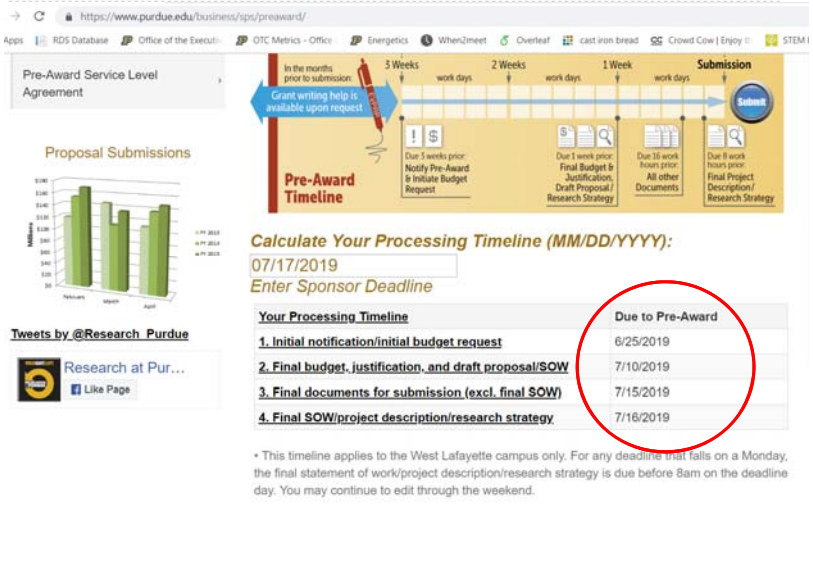
# Follow PreAward Deadlines as Minimum

**https://www.purdue.edu/business/sps/preaward/**

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## Compliance Check

Read NSF Grant Proposal Guide as well as RFP

NSF returns many CAREERs without Review.
Remember…

- Include department chair letter
- Font, margin, page count follows GPG
- Budget in allowable range
- No Co-PIs
- No unauthorized documents, e.g. support letters

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## Top 10 CAREER Mistakes

10. Difficult to read with small fonts, illegible figures, too many acronyms
9. Unsubstantiated use of “innovative,” “novel,” “transformative”
8. Poor distinction between preliminary results and proposed work
7. Incremental research with narrow focus

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## NSF Top Ten Mistakes

6. Long sentences and unclear writing
5. Too similar to PhD work
4. Business-as-usual education plan
3. Little impact in broader impacts
2. Treating as a regular proposal instead of long-term trajectory

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## NSF Top Ten Mistakes

1. **Research plan lacking cohesion**
   - Collection of loosely related ideas
   - No gap identified to provide rationalization

*Tell a story with your narrative*

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# Questions?

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