National Science Foundation Overview
Brown Bag Session
September, 2013

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Grants Editor
College of Engineering and Science
Overview

- Founded in 1950
- An independent federal agency
- Responsible for advancing science and engineering
- Makes merit-based grants and cooperative agreements
  - Individual researchers and groups
  - Colleges, universities,
  - Other institutions: public, private, state, local and federal
- Peer-review and evaluation of 51,000 proposals (FY11-13) submitted by science and engineering research and education communities
  - 11,760 new awards – 24 percent (success rates differ for different programs)
Award (Grant) Types

- Individual Investigator Initiated Awards
- CAREER Awards
- Center Awards
- SBIR/STTR awards
- EAGER Awards (Early Concept Grants for Exploratory Research)
- Supplements
- Workshops, conferences
NSF Organizational Structure - Funding

Numbers are for FY 2012
NSF SUPPORT OF ACADEMIC BASIC RESEARCH
IN SELECTED FIELDS
(as a percentage of total federal support)

- All Science and Engineering Fields: 21%
- Engineering: 39%
- Physical Sciences: 47%
- Environmental Sciences: 57%
- Social Sciences: 57%
- Mathematics: 65%
- Biology*: 68%
- Computer Science: 82%

*Excludes the National Institutes of Health.

Source: NSF Survey of Federal Funds for Research and Development.
Figure 6
NUMBER OF NSF COMPETITIVE PROPOSALS, NEW AWARDS, AND FUNDING RATES

<table>
<thead>
<tr>
<th>Year</th>
<th>Competitive Proposals</th>
<th>New Awards</th>
<th>Funding Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2008</td>
<td>11,024</td>
<td>25%</td>
<td>43,907</td>
</tr>
<tr>
<td>FY 2009</td>
<td>14,642</td>
<td>32%</td>
<td>45,218</td>
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<tr>
<td>FY 2010</td>
<td>13,015</td>
<td>23%</td>
<td>55,562</td>
</tr>
<tr>
<td>FY 2011</td>
<td>11,207</td>
<td>22%</td>
<td>51,577</td>
</tr>
<tr>
<td>FY 2012</td>
<td>11,534</td>
<td>24%</td>
<td>48,623</td>
</tr>
</tbody>
</table>

LEGEND:
- COMPETITIVE PROPOSALS
- NEW AWARDS
- FUNDING RATE (%)
Figure 2

NSF AWARD MECHANISMS AND INSTITUTIONS FUNDED
FY 2011 Obligations for Research and Education Programs
($6,595 million)

<table>
<thead>
<tr>
<th>AWARD MECHANISMS</th>
<th>INSTITUTIONS FUNDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracts</td>
<td>Federally Funded R&amp;D Centers</td>
</tr>
<tr>
<td>$416 million</td>
<td>$305 million</td>
</tr>
<tr>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Cooperative Agreements</td>
<td>Other</td>
</tr>
<tr>
<td>$1,508 million</td>
<td>$385 million</td>
</tr>
<tr>
<td>23%</td>
<td>6%</td>
</tr>
<tr>
<td>Grants</td>
<td>Private Industry</td>
</tr>
<tr>
<td>$4,671 million</td>
<td>$815 million (includes Small Business)</td>
</tr>
<tr>
<td>71%</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Colleges, Universities, and Academic Consortia</td>
</tr>
<tr>
<td></td>
<td>$5,090 million</td>
</tr>
<tr>
<td></td>
<td>77%</td>
</tr>
</tbody>
</table>

Notes: NSF Research and Education Programs include Research & Related Activities, Education & Human Resources, and Major Research Equipment & Facilities Construction appropriations. Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations.
Emphasis on Fundamental Research

- Undertaken to increase the...knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

- Basic research - *systematic study* directed towards fuller...understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products

- Applied research - *systematic study* to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.
Emerging Frontiers in Research and Innovation (EFRI)

Program Director for Strategic Operations

Asst. Director for Engineering
Deputy Assistant Director

Senior Advisor Nanotechnology
Program Director for Diversity

Engineering Education and Centers (EEC) $124M
Civil, Mechanical, and Manufacturing Innovation (CMMI) $188M
Chemical, Bioengineering, Environ. & Transport Syst. (CBET) $156M
Electrical, Communications and Cyber Systems (ECCS) $94M
Industrial Innovation and Partnerships (IIP) $152M
$125M SBIR
Overall ENG Funding Rate — 17%
EEC Areas of Interest

- Seeks to enable a system of engineering education, equally open to all members of society, that dynamically and rapidly adapts to meet changing needs. Research areas include:
  - Understanding how engineering students learn and the capacity that supports such discovery
  - Understanding how to increase the diffusion and impact of engineering education research
  - Understanding engineering education in broader frameworks such as sustainability
  - Diversifying pathways to and through engineering degree programs

CMMI Areas of Interest

- **Advanced manufacturing**: transformative advances in manufacturing and building technologies, with emphases on efficiency, economy, and sustainability
- **Mechanics and engineering materials**: advances in the transformation and use of engineering materials efficiently, economically, and sustainably
- **Resilient and sustainable infrastructures**: to advance fundamental knowledge and innovation for resilient and sustainable civil infrastructure and distributed infrastructure networks
- **Systems engineering and design**: decision-making aspects of engineering, including design, control, and optimization

CBET Areas of Interest

- **Chemical, biochemical, and biotechnology:** processing and manufacture of products by effectively utilizing chemical and renewable resources
- **Biomedical engineering and engineering healthcare:** to integrate engineering and life science to solve biomedical problems
- **Environmental engineering and sustainability:** to reduce adverse effects of solid, liquid, and gaseous discharges into land, water, and air that result from human activity and impair the ecological value of those resources
- **Transport and thermal fluids phenomena:** thermal, mass, and momentum transport that enable new technological solutions to understand pressing issues in energy, environment, manufacturing, health care, and other fields

**Single Annual Proposal Window per program**

ECCS Areas of Interest

- Address fundamental research issues at the nano, micro, and macro scales underlying device and component technologies, energy and power, controls, networks, communications, computation, sensing and cyber systems

- Support integration of systems principles in complex engineering systems and networks for a variety of applications areas

- Ensure education of a diverse workforce to meet the technological challenges of a 21st century global economy

Submission window for unsolicited proposals in the ECCS Division
October 1-November 1 annually
Directorate - Math/Physical Sciences (MPS)
FY 2012 ($1,332 in Millions)

Asst. Director
Deputy Assistant Director

Division of Astronomical Sciences
$240M

Division of Chemistry
$238M

Division of Materials Research
$304M

Division Of Mathematical Sciences
$236M

Division Of Physics
$280M

Office of Multidisciplinary Activities
Mission – Math/Physical Sciences Directorate (MPS)

- To make discoveries about the Universe and the laws that govern it
- To create new knowledge, materials, and instruments which promote progress across science and engineering
- To prepare the next generation of scientists through research, and to share the excitement of exploring the unknown with the nation

MPS Statistics

- Largest directorate
- Nearly half of NSF’s large facilities
- Responsible for the three “core” university disciplines—Physics, Chemistry, Mathematics—and Astronomy and Materials Research
- Over 40% of university federal funding in the physical sciences
- More than 80% in mathematics, and growing
Overall MPS Funding Rate — 25%
Chemistry

- PIs may submit to the following programs between Sept.1-30th:
  - Chemical Catalysis - CAT
  - Chemical Structure, Dynamics and Mechanisms - CSDM A
  - Chemical Structure, Dynamics and Mechanisms - CSDM B
  - Chemical Theory, Models and Computational Methods - CTMC
  - Chemical Synthesis - SYN

- And to the following programs between Oct.1-31st:
  - Chemical Measurement and Imaging - CMI
  - Chemistry of Life Processes - CLP
  - Environmental Chemical Sciences - ECS
  - Macromolecular, Supramolecular and Nanochemistry - MSN

Fiscal Year 2010 Distribution of Individual Investigator Awards in Chemistry

### Division of Chemistry Disciplinary Research Programs

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<tr>
<th>Program</th>
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<tbody>
<tr>
<td>Environmental Chemical Sciences (ECS)</td>
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<tr>
<td>Theory, Models &amp; Computational Methods (TMC)</td>
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<tr>
<td>Chemistry of Life Processes (CLP)</td>
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<tr>
<td>Chemical Measurement &amp; Imaging (CMI)</td>
</tr>
<tr>
<td>Chemical Catalysis (CAT)</td>
</tr>
<tr>
<td>Chemical Synthesis (SYN)</td>
</tr>
<tr>
<td>Macromolecular, Supramolecular, &amp; Nanochemistry (MSN)</td>
</tr>
<tr>
<td>Chemical Structure, Dynamics, and Mechanisms (CSDM)</td>
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</tbody>
</table>
Fiscal Year 2010 Research Awards in Chemistry

<table>
<thead>
<tr>
<th>Research Proposal Type</th>
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<tbody>
<tr>
<td>Unsolicited Research Proposals (Individual and Collaborative)</td>
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<tr>
<td>NSF CAREER (Faculty Early Career Development Program)</td>
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<tr>
<td>NSF RUI (Research in Undergraduate Institutions)</td>
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<tr>
<td>CHE ICC (International Collaboration in Chemistry Program)</td>
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<tr>
<td>NSF EAGER (Early Concept Grants for Exploratory Research)</td>
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<tr>
<td>CHE SCIART (now Cultural Heritage Science)</td>
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<tr>
<td>NSF GOALI (Grant Opportunities for Academic Liaison with Industry Program)</td>
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<tr>
<td>NSF RAPID (Rapid Response Grants)</td>
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</tbody>
</table>
Materials Research - Programs

- Ceramics, Electronic and Photonic Materials, Metals and Metallic Nanostructures
- Condensed Matter Physics, Condensed Matter and Materials Theory
- Biomaterials, Polymers, Solid-State and Materials Chemistry
- Materials Research Science and Engineering Centers
- National Facilities and Instrumentation
- Office of Special Programs (international collaboration; education)

Window for submitting unsolicited proposals to DMR
September 1-October 31, annually
Materials Research - Funding

- Individuals and Groups: 42%
- Facilities: 20%
- MRSEC: 18%
- Nano Centers STCs: 3%
- Education and Workforce: 6%
- Instrumentation: 2%
- CAREER: 7%
Mathematical Sciences

- Supports projects aimed at developing and exploring the properties and applications of mathematical structures.
- Most awards to single investigators or small groups of investigators working with graduate students and postdoctoral researchers.
- DMS Funding 2012-2013 30%
  - 74% - Analysis, Algebraic Number Theory, Geometry, Applied Math, Computational Math, Probability Stats,
  - 26% - Workforce and Institutes

Physics

- Awards
  - “Core Business” - Single investigators, groups - 58%
  - Centers and institutes – 4%
  - Research equipment/instrumentation – 35%
  - Education workforce – 3%

- Portfolio of Research more diverse than at any other agency

Mission – Computer and Information Science and Engineering Directorate

➢ To promote the progress of computer and information science and engineering research and education

➢ To promote understanding of the principles and uses of advanced computer, communications, and information systems in service to society

➢ To contribute to universal, transparent, and affordable participation in an information-based society

Directorate for CISE
FY 2012 ($653 in Millions)

Asst. Director
Deputy Assistant Director

Division of Computing and Communication Foundations (CCF)
  Algorithmic Foundations (AF)
  Communications and Information Foundations (CIF)
  Software and Hardware Foundations (SHF)

Division of Computer and Network Systems (CNS)
  Computer System Research (CSR)
  Research Infrastructure Program (RIP)
  Networking Technology and Systems (NeTs)
  Education and Workforce Program

Division of Intelligent Information Systems (IIS)
  Human-Centered Computing Cluster (HCC)
  Information Integration and Informatics Cluster (IIP)
  Robust Intelligence Cluster (RI)
Overall CISE Funding Rate — 17%
Contacting Program Managers

- Use the web to identify the most likely program office(s) for your ideas
- Email them a ONE PAGE description of your idea and request a 20 minute phone call to discuss
- Be sure to ask them if they are the right person to talk to about the idea before you schedule the call.
- Use NSF concepts broader impacts and intellectual merit. Communicate your research questions - be succinct and have a few specific questions for their feedback.
Contacting Program Managers

- If in the DC area, follow the same advice but request a personal meeting

- Remember they cannot accept gifts so no suggestions about discussing your idea over lunch – stays in the office

- Try several program officers in various divisions/programs - there is likely more than a single fit
Becoming a Reviewer

- Look at the NSF website for upcoming due dates, and email the program officer expressing an interest in being a reviewer.

- Include a 2 page short NSF-style CV so they can tell if you're a good fit.

- Make the email like a cover letter-tell of any previous funding before (e.g. specialty, your particular fit for a certain program)

- If you have a friend/colleague who has reviewed for a particular program or program officer before, mention their name or get them to write an intro email for you
Becoming a Reviewer

- If you have a friend/colleague who has reviewed for a particular program or program officer before, drop their name or get them to write an intro email for you

- Ask them to pass your name around and/or add you to their list

- Try several program officers in various divisions/programs—there may be more than a single fit
Why is being a reviewer helpful?

- You learn how to think like a reviewer
- As you write you place upon your head the "reviewer's hat" and write as if you are writing for the reviewer as your audience
- One reviewer has done so 15 times and has learned something new to hone their proposal skills
Submitting a proposal

- Access the College of Engineering (CoES) pre-awards website http://people.clemson.edu/~CoESPro/

- CLICK the Orange Submission Notification Tiger Paw to send NOTIFICATION to our office about Upcoming Proposals.

- Include Sponsor, Due Date, and any proposal materials. You will be assigned a research administrator and receive a confirmation email.
CoES Proposal Development

College of Engineering and Science Proposal Development is a Decentralized, Service-oriented unit that assists faculty with pre-award activities.

CONTACT: Before starting your proposal please CONTACT our Certified Research Administrators and/or our Editor in 113 Riggs for assistance. Our Research Administrators provide assistance with sponsor and internal forms, budget development and ensure compliance with sponsors' guidelines. Our Proposal Editor gathers information, writes text, provides advice about sponsor policies, provides templates, and edits proposals.

CLICK: Please CLICK on the Orange Submission Notification Tiger Paw to the right (an email will open for Outlook users) to send NOTIFICATION to our office about your Upcoming Proposals. Please include in the email: Sponsor, Due Date, and any proposal materials. You will be assigned to one of our Research Administrators and receive a confirmation email.

Announcements

2013 New Faculty
We enjoyed seeing all of our new faculty at the 2013 New Faculty Orientation. We are looking forward to working with all of you. Welcome to Clemson University!!
Questions?

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