Funding Opportunities at the National Science Foundation that Support Education

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Caution:

Most of the information presented today represents the opinions of the individual program officer and not an official NSF position.
NSF Programs that have supported Undergraduate Education

- CCLI-Course Curriculum and Laboratory Improvement.
- STEP -- S\textsubscript{TEM} Talent Expansion Program
- S-STEM -- NSF Scholarships in STEM disciplines
- Noyce -- Scholarship Program for Teacher Education.
I. CCLI (Course, Curriculum and Laboratory Improvement): Transforming the Undergraduate Experience of Science, Technology, Engineering and Mathematics

Vision

Excellent STEM education for all undergraduate students.

Goal

Stimulate, disseminate, and institutionalize innovative developments in STEM education with special interest in transformative proposals.
Include one or more of these five project components

- Create learning materials and teaching strategies
- Develop faculty expertise
- Implement new instructional strategies
- Assess learning and evaluate student achievement
- Conduct research on undergraduate STEM education
CCLI Program

- Especially encourages projects that:
  - Have potential to transform undergraduate STEM education
  - Produce widespread adoption of classroom practices based on how students learn
  - Explore cyberlearning
Three Types of Projects and one Special Project

- **Type 1**
  - $200,000
  - 1 to 3 years
  - $50,000 with community college partner

- **Type 2**
  - $600,000
  - 2 to 4 years

- **Type 3**
  - Less than $5,000,000
  - up to 5 years

- **CCLI Central Resource Project**
Type 1 Projects

- Typically involve a single institution
- Typically involve one program component
- Contribute to the understanding of undergraduate STEM education
Type 2 and 3 Projects

- Typically involve multiple institutions & several program components – but exceptions exist.
- Typically based on prior work with results explicitly described – but exceptions exist.
- Typically are institutionalized at the lead institution.
The CCLI Program was recently modified.

- Please look for the new solicitation at nsf.gov and the name may be changed to TUES (Transforming Undergraduate Education in STEM)

- Solicitation is forthcoming

- Deadlines
  - Were May 21 or 22, 2009 for Type 1s and we anticipate a later deadline in 2010 for Type I proposal.
  - Will probably be mid-January 2011 (Type 2 and 3 and Special Project)
The CCLI Program Statistics for Chemistry.

<table>
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<tr>
<th>Year</th>
<th>2005</th>
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<th>2007</th>
<th>2008</th>
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<td>100</td>
<td>93</td>
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From 2005 to 2008 the number of CCLI Chemistry Proposals was $91 \pm 10$ but this year there were 60% more chemistry proposals. Keep up the good effort!!!!
II. STEP:
STEM Talent Expansion Program

Goal: to increase the number of students (U.S. citizens or permanent residents) RECEIVING associate or baccalaureate degrees in established or emerging fields within science, technology, engineering, and mathematics (STEM)

Focus: on the number of majors/graduates
STEP Deadlines

Letter of Intent:
August 17, 2010 (optional)

Proposal Due Date:
September 28, 2010

Solicitation: 08-569
STEP Projects

- **Type 1:** Implement strategies that will increase the number of students obtaining STEM degrees.

- **Type 2:** Conduct research on factors affecting associate or baccalaureate degree attainment in STEM
STEP Projects

- Now three categories of Type 1 proposals
  -- Type 1A - For institutions with no prior STEP support
  -- Type 1B - For new five-year implementation projects at institutions that have been the lead on a previous Type 1 award
  -- Type 1C - Follow-on grants (1-3 years) for existing Type 1 awardees
STEP: Budget Guidelines

Type 1 (Implementation)
$500 K for 5 years for up to 5,000 undergrad students
$1.0 M for 5 years for 5,000-15,000 undergrad students
$2.0 M for 5 years for >15,000 undergrad students

Type 2 (Research)
$500K/year for 3 years
Proposals should include:

- **The specific strategies** to be used during the grant period to increase the number of STEM graduates
- **An explanation** of why the proposed activities are not expected to cause decreases in enrollments in other STEM fields
- **The benchmarks** that will be used to measure progress as the project moves forward
- **A clear statement** of which of the proposed activities, if successful, would be expected to be institutionalized by the end of the grant period
Features of Strong Proposals

- **Focus on Recruitment and Retention**
  - Set up numerical targets for each; pipeline model

- **Usually more than one STEM discipline included**
  - Avoid reducing majors in other STEM majors

- **STEM Faculty are PIs**

- **Strong administrative support plus buy-in from key departments**
Features of Strong Proposals con’t

Successful projects might provide:

- Bridge programs that enable additional preparation for students from HS or community colleges
- Programs to improve the quality of student learning
  - Peer tutoring, learning communities
  - New pedagogical approaches (e.g., mastery learning, active learning, SENCER courses)
- Programs to encourage early undergraduate research
- Student support mechanisms
- Curricular innovations that will enhance retention/recruitment
Outcomes Expected for Type 1

- *Significant progress* toward achieving the proposed increases in the number of students in STEM
- *A description of the activities* institutionalized as a result of the project
- *A description of continued efforts* at the institution to increase the number of students in STEM
- *An evaluation* using the benchmarks defined in the proposal informing the broader community of the progress and findings of the grant project
- *Dissemination* of project processes and results to the broader community
III. S-STEM Program Overview

- Goal – To increase the number and quality of graduates in Science, Technology, Engineering, and Mathematics (STEM)

- Focus on the workforce.
S-STEM Deadlines

- Full Proposal Deadline Date:
  -- August 12, 2010

- Letter of Intent Deadline Date:
  -- July 14, 2010

- Solicitation: 09-567
This Scholarship Program is funded from fees that employers pay to the US to obtain a work visa that allows the hiring of a foreign high-tech worker.

- The intent of the program is to use the money raised from H-1B visa fees to produce more US graduates for the high-tech workforce.

- Budget: $600,000 maximum award. Up to 10% of scholarship request for student support/curricular reform and 5% of scholarship amount for administrative support.

Example: $520,000 for scholarships then allows $52,000 for student support and $26,000 for administrative expenses. Total request would then be $596,000.
Congress created the program, and some aspects are specified in the legislation:

- **Student citizenship status** [Citizen or permanent resident]
- **Student characteristics** [Financial need and Academic ability]
- **Degree level** [Students enrolled in a program leading to an Associate, Baccalaureate, or Graduate Degree in a STEM field.]
- **Maximum scholarship amount per student** [$10,000 per year]
S-STEM Program Overview con’t

- Colleges and Universities submit proposals to NSF to operate a scholarship project within parameters of the S-STEM Program Solicitation.
- Institutions may request up to 5 years of scholarship funds.
- Institutions propose many of the project’s other parameters and management plans.
- S-STEM projects emphasize four activities: recruitment, selection, retention, and placement.
Program open to students in the following disciplines:

- biological sciences (except medicine and other clinical fields);
- physical sciences, including physics, chemistry, astronomy, and materials science;
- mathematical sciences;
- computer and information sciences;
- geosciences;
- engineering;
- technology areas associated with the preceding fields (for example, biotechnology, chemical technology, engineering technology, information technology, etc.)
Characteristics of a Strong Project Management

- Strong academic programs
- Involvement of disciplinary faculty as advisors, mentors and managers of the project
- Clear management plan that identifies: roles, responsibilities, & project timeline
- Plans for evaluation of the project: how will we know if it works?
Characteristics of a Strong Project

Students

- Clear student selection plan
- Enough eligible students
- Plans for formation of a student cohort
- Good student support structures
- Clear plans for student selection
- Plan for placement of students: work or further education
Student Support Structures

- No set list; some examples:
  - Meetings – formal and informal (pizza party?)
  - Mentoring – from faculty and more-advanced students
  - Presentations, conferences – sense of professional identity
  - Research opportunities (optional for undergrads)
  - Tutoring – both as student and as tutor
  - Work, summer internship – to augment scholarship (optional)
Measuring Outcomes

- Success for student
  - Grades and recognition
  - Time to degree
- Numbers of students graduated
- Infusion into the workforce or further education
- Benefits to academic departments
- Project does not need a contract evaluator
Proposal & Award Statistics

Planned Operation

- Program has approx. $50 million to award for scholarship projects this year

- Program expects to make approx. 85-90 awards for up to 5 years of support
### 2008 Proposals

<table>
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<tr>
<th>Institution highest degree</th>
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<tr>
<td>Bachelors</td>
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<tr>
<td>Masters</td>
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<td>5</td>
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<tr>
<td>Doctoral</td>
<td>92</td>
<td>8</td>
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<td>TOTAL</td>
<td>277</td>
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## 2009 Proposals

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<tbody>
<tr>
<td>Two-year</td>
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<td>6</td>
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<tr>
<td>Bachelors</td>
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<td>10</td>
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<tr>
<td>Masters</td>
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<td>7</td>
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<tr>
<td>Doctoral</td>
<td>143</td>
<td>13</td>
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<td>TOTAL</td>
<td>401</td>
<td>36</td>
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</table>
Distribution of S-STEM Awards

Total S-STEM Awards
By Institution Type
1999-2008

- PhD: 38%
- Master's: 27%
- Bachelor's: 24%
- Community Colleges: 10%
- Private: 1%
IV. Robert Noyce Teacher Scholarship Program

- Initiated by Act of Congress in 2002
- Reauthorized in 2007 (America COMPETES Act)
- To encourage talented mathematics, science, and engineering students to pursue teaching careers
- To encourage STEM professionals to become teachers
- To prepare Master Teachers
Solicitation: 10-514

- Letters of Intent (optional): February 9, 2010
- Full Proposal Deadline: March 10, 2010
  5:00 P.M. proposer’s local time

Proposals may only be submitted by:

-- Universities & 2- or 4-year colleges
-- Nonprofit entities that have established consortia with Institutes of Higher Education (IHE)

Principal Investigators:

-- The PI, or at least one Co-PI, must be a faculty member in a STEM department.
A. Robert Noyce Teacher Scholarship Track

- Scholarships for undergraduate STEM majors preparing to become K-12 Teachers
- Internships for freshmen and sophomores
- Stipends for STEM professionals seeking to become K-12 teachers

B. NSF Teaching Fellowships (TF) & Master Teaching Fellowships (MTF) Track

- Fellowships for STEM professionals receiving teacher certification through a master’s degree program
- Fellowships for science and math teachers preparing to become Master Teachers
A. Robert Noyce Scholarship Track

1. Phase I: For new awardees or new project with different focus

2. Phase II: For previously funded awardees -
   - Scholarships & Stipends: To expand and extend evaluation efforts begun under previous award and support additional cohorts of scholarship and stipend recipients
   - Monitoring and evaluation: To expand and extend evaluation efforts of previous project without support for additional cohorts.
A. Noyce Scholarship Track

1. Phase I

- Scholarships, Stipends, Internships
- Award size up to $1,200,000
- Duration up to 5 years
- No indirect costs
- Administrative/programmatic costs may not exceed 20% of total budget
- 80% of budget for direct support to participants
A. Noyce Scholarship Track con’t

2. Phase II

Scholarships and Stipends plus longitudinal evaluation studies of previously supported cohorts of students

- Award size up to $750,000; up to 5 yrs.
- Up to 20% of budget for admin./programmatic costs
- 80% of budget for direct support to participants
- No Indirect Costs

Monitoring and Evaluation

- Award size up to $150,000; up to 3 yrs.
- Indirect costs allowed
A. Noyce Scholarship Track-con’t

Projects include:

- Recruitment strategies
- STEM faculty collaborating with Education faculty
- Strong partnership with school district
- Exemplary teacher preparation programs leading to certification
- Support for new teachers
- Mechanism for monitoring recipients
- Evaluation
A. Noyce Scholarship Track-con’t

- Recipients commit to teaching in a high need school district for 2 years for each year of scholarship/stipend support.

- Recipients failing to meet service requirement must repay scholarship.

- Students graduate with a degree in a STEM discipline and teacher certification and/or licensing.

- One-year stipends of at least $10,000 for STEM professionals (career-changers) and post-baccalaureate students to obtain teacher certification.
B. NSF Teaching Fellowships (TF) & Master Teaching Fellowships Track (MTF)

1. NSF Teaching Fellows
   - STEM professionals who enroll in a master’s degree program leading to teacher certification or licensing

2. NSF Master Teaching Fellows
   - STEM teachers who have master’s degrees and participate in a program for developing Master Teachers.
B. Teaching Fellowships & Master Teaching Fellowships Track con’t

1. NSF Teaching Fellows:
   - STEM professionals pursuing master’s degrees leading to teacher certification
   - Receive one-year stipend of at least $10,000 while enrolled in the Master’s degree program
   - Commit to teach for 4 years in a high need school district
   - Receive annual salary supplement of at least $10,000 while fulfilling teaching commitment
B. Teaching Fellowships & Master Teaching Fellowships Track con’t

2. NSF Master Teaching Fellows:
   - Fellowships for math and science teachers preparing to become Master Teachers
   - Commit to teach for 5 years in a high need school district
   - Receive annual salary supplement of at least $10,000 for 5 years while fulfilling the teaching commitment
B. Teaching Fellowships & Master Teaching Fellowships Track con’t

TF/MTF Proposals
- Award size up to $3 million over 5-6 years
  Additional $250,000 for collaboration with two-year colleges
- No Indirect Costs
- Matching funds required equal to 50% of grant request, excluding two-year college incentive
- At least 80% of budget for direct support to participants (stipends, salary supplements, professional development)

TF/MTF Planning Grants
- Award size up to $75,000 over 1 year
- Indirect costs allowed
- No matching funds required
Summary: some suggestions.

1. Become a Reviewer.

2. Obtain examples of successful proposals. Public record.

Go to NSF homepage (nsf.gov)

Select “Education Directorate” or some other directorate.

Select “Division of Undergraduate Education”
Undergraduate Education (DUE)

Programs and Funding Opportunities

Key: Crosscutting | NSF-wide

- Advanced Technological Education (ATE)
- Computational Science Training for Undergraduates in the Mathematical Sciences (CSUMS)
- Cooperative Activity with Department of Energy Programs for Education and Human Resource Development (Request for Supplement)
- Course, Curriculum, and Laboratory Improvement (CCLI)
- Federal Cyber Service: Scholarship for Service (SFS)
- Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM)
- Math and Science Partnership (MSP)
- Nanotechnology Undergraduate Education (NUE) in Engineering
- National STEM Education Distributed Learning (NSDL)
- NSF Director’s Award for Distinguished Teaching Scholars (DTS)
- NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)
- Robert Noyce Teacher Scholarship Program
- Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)

Featured NSF-wide Programs
NOTE CONCERNING FUTURE ANTICIPATED DEADLINES

The S-STEM program expects to have proposal deadlines in August in 2009 and beyond. A new Program Solicitation will be available at least 3 months before the deadline.

CONTACTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duncan E. McBride</td>
<td><a href="mailto:dmcbride@nsf.gov">dmcbride@nsf.gov</a></td>
<td>(703) 292-4630</td>
<td>835 N</td>
</tr>
<tr>
<td>Lesia L. Crumpton-Young</td>
<td><a href="mailto:kcrumpto@nsf.gov">kcrumpto@nsf.gov</a></td>
<td>(703) 292-4629</td>
<td>835 N</td>
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<tr>
<td>Bert E. Holmes</td>
<td><a href="mailto:bholmes@nsf.gov">bholmes@nsf.gov</a></td>
<td>(703) 292-5128</td>
<td>835 N</td>
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PROGRAM GUIDELINES

Solicitation 07-524

Please be advised that the NSF Proposal & Award Policies & Procedures Guide (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPPG Guide Part II: Grant Proposal Guide Chapter II for further information about the implementation of this new requirement).

SYNOPSIS

This program makes grants to institutions of higher education to support scholarships for academically talented, financially needy students, enabling them to enter the workforce following completion of an associate, baccalaureate, or graduate level degree in science and engineering disciplines. Grantee institutions are responsible for selecting scholarship recipients, reporting demographic information about student scholars, and managing the S-STEM project at the institution.

The program does not make scholarship awards directly to students; students should contact their institution’s Office of Financial Aid for this and other scholarship opportunities.

EDUCATIONAL OPPORTUNITY

This program provides educational opportunities for Undergraduate Students. This program provides indirect funding for students at this level or focuses on educational developments for this group such as curricula development, training or retention. To inquire about possible funding opportunities not directly from NSF, please look at the active awards for this program.

Abstracts of Recent Awards Made Through This Program
<table>
<thead>
<tr>
<th>Award Number</th>
<th>Title</th>
<th>NSF Organization</th>
<th>Program(s)</th>
<th>Start Date</th>
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<th>Organization</th>
<th>Awarded Amount to Date</th>
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<td>0850228</td>
<td>Computation for Interdisciplinary Science</td>
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<td>S-STEM:SCHLR SCI TECH ENGMATH</td>
<td>09/01/2009</td>
<td>Pruim, Randall</td>
<td>MI</td>
<td>Calvin College</td>
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<td>0850384</td>
<td>Supernova: Seeding Talent in Physics and Astrophysics to Prepare the Next Generation Workforce in the Bay Area</td>
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<td>Belanger, David</td>
<td>CA</td>
<td>University of California-Santa Cruz</td>
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<td>0850106</td>
<td>Tele the Community: Changing Perceptions and Increasing Participation in Computer Science</td>
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<td>09/01/2009</td>
<td>Shepp, Elizabeth</td>
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<td>0850120</td>
<td>Preparing Promising Students for the 21st Century Scientific Workforce</td>
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<td>Strausbaugh, Linda</td>
<td>CT</td>
<td>University of Connecticut</td>
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<td>0849924</td>
<td>Broadening Opportunities for Biologists</td>
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<td>Baum, Kristen</td>
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<td>0850316</td>
<td>Technology, Engineering, and Math Science (TEAMS)</td>
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<td>0850283</td>
<td>Undergraduate Student Scholarships for Participation in Interdisciplinary Computational Science and Engineering Research</td>
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<td>09/01/2009</td>
<td>Castillo, Jose</td>
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<td>0850596</td>
<td>Engaging Engineers in Scholarship (EES) Fellows: A Scholarship Program for Engineering Freshmen and Transfer Students</td>
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<td>S-STEM:SCHLR SCI TECH ENGMATH</td>
<td>09/01/2009</td>
<td>Fournier, William</td>
<td>MD</td>
<td>University of Maryland College Park</td>
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<td>0850317</td>
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<td>09/01/2009</td>
<td>Davis, Will</td>
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<td>Los Rios Community College District</td>
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<td>0849991</td>
<td>da Vinci Scholarship Program: Promoting the Integration of Engineering, Business, &amp; Art to Inspire Ingenuity</td>
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<td>S-STEM:SCHLR SCI TECH ENGMATH</td>
<td>09/01/2009</td>
<td>Adams, Stephanie</td>
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<td>0850027</td>
<td>Scholars in Math and Science (SIMS), a program to enhance diversity in the sciences.</td>
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<td>085026</td>
<td>Granting Access to Math and Science (GRAMS)</td>
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<td>0849592</td>
<td>Preparing for Innovation Producing Educated STEM Scholars (PRESSTEMS)</td>
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<td>0849441</td>
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</table>
E-mail the PI or co-PI and request a copy of their proposal. Also ask about any changes that were made during the negotiating process.
Support at the National Science Foundation for Undergraduate Research

Bert E. Holmes

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Program Director
National Science Foundation

Millersville University
Pennsylvania State System of Higher Education

February 19, 2010
Outline of Presentation

A. Overview of Programs that have supported Faculty Engaged in Undergraduate Research

B. Overview of Programs that have supported Departments Engaged in Undergraduate Research
A. Overview of NSF Programs that have supported Undergraduate Research of a PI

- RUI - Research at Undergraduate Institutions.
- ROA Supplement - Research Opportunity Awards
- RET Supplement - Research Experiences for Teachers (secondary school teachers)
- REU Supplements (for students to join your research)
- MRI - Major Research Instrumentation
1. Research at Undergraduate Institutions (RUI) is Education of Undergraduates

- Housed within the specific research division not DUE

- RUIs are typically 3-year awards

- RUI-Regular research proposal with special section in the proposal titled “RUI Impact Statement” of up to five pages.
RUI con’t

- “Model Compounds for P460 from Hydroxylamine Oxidoreductase (HOA)” at Saint Francis University

0718749 for 3-years $95,335

Study of models for HAO in Nitrosomonas europea (Ne), an autotrophic soil bacteria that oxidizes nitrogenous materials in order to make energy.
RUI con’t

“Innovative Determination of Phase Diagrams of Surfactants in Water and Ionic Liquids” at Harvey Mudd College

0809440 for 3-years $270,000

Research on surfactants prepared from renewable resources that are of great practical interest as environmentally-safe, biodegradable, and nonionic materials for pharmaceutical, cosmetic, and food.
2. ROA-Research Opportunity
Award: Supplement Opportunity

- ROAs enable faculty at predominantly undergraduate institutions, including community colleges, to pursue research as visiting scientists with NSF-supported investigators at other institutions.

- Goal is to “enhance the research productivity and professional development of science faculty at undergraduate institutions through research activities that explore the emerging frontiers of science”.

- Housed within the specific research division not DUE
ROA-con’t

- First discuss supplement with the cognizant Program Officer.

- Prospective visiting ROA researcher and the NSF-supported PI at the host institution should work together to develop a research plan and budget.

- The nature of the research responsibility, the duration of the ROA visit, salary, and other arrangements with respect to employment, are matters to be negotiated between the host institution, the PI, the prospective visiting scientist, and his/her home institution, as the proposal is developed.
ROA-con’t

- An ROA supplement can be requested on a current award or when submitting a new or renewal proposal.
- Most frequently, ROA activities are summer experiences, but partial support of sabbaticals may also be provided.
- ROA supplements are usually less than $25,000 including indirect costs.
- Details vary according to discipline. (NSF-00-144 has general guidelines)
3. REU and RET-Supplements

- REU Supplements are similar to ROA Supplements except that a request is made to support a student from another institution by a PI with a NSF research award.
- RET Supplements support a high school chemistry teacher.
- Housed within the individual research Division not DUE.
- Support level is typically less than $10,000 for REU and somewhat larger for RET.
4. MRI-Major Research Instrumentation

- Multi-user proposals are more common than single user proposals.
- Housed within the specific research division not DUE
- Support level is normally at least $75,000 but there is no upper limit.
- Must have research active faculty with a record of publishing in peer-reviewed journals.
- Research instrumentation at Undergraduate Institutions may (should) be used in undergraduate teaching laboratories as well as in undergraduate research experiences.
MRI-Major Research Instrumentation

- Foundation-wide activity (NSF cross-cutting)

- Emphasis on research but must have important educational component

- NSF overall - FY08: $93.9 M plus ARRA funding.
MRI-Major Research Instrumentation

- “Acquisition of a Field Emission-Scanning Electron Microscope for Nanoscience Research and Education”

- Texas A&M University-Kingsville

- 0821370 for $307,250
B. NSF Programs that Support Research at a Department Level

- REU – Research Experiences for Undergraduates
Research Experiences for Undergraduates: REU

- Research Experiences for Undergraduates (REU) supports active research participation by undergraduate students in any of the areas of research funded by the National Science Foundation.

- REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program.
REU con’t


- 3-Year Awards for about $200,000-$500,000 total.

- Over 50 REU Chemistry sites
Specific REU Site

- “Sustainability, Energy and Engineering REU Site” at North Carolina State University

- 0552750 for 3-years $499,301

- REU Site on environmentally sustainable products and processes, and energy that supports 11 undergraduate students per year for three years in a 10-week research and professional development program
Specific REU Site con’t

- “Undergraduate Interdisciplinary Research Emphasizing the Application of Environmental Chemistry to Address Societal Issues” at the University of North Dakota

- 0552762 for 3-years $221,592

- Students will gain experience in research projects in the area of gas-phase chemistry and related environmental chemistry.
Thanks for your attention

• Questions or Comments

• DUE Information System bholmes@nsf.gov

• DUE Web Site

VOLUNTEER TO REVIEW PROPOSALS!
CONTACT A PROGRAM OFFICER – SEE DUE WEB SITE!