Programs in the NSF Division of Undergraduate Education (DUE) that support chemistry education

199th Conference of the Two-Year College Chemistry Consortium
Arizona Western College, Yuma, AZ – November 9, 2012

David R. Brown, Program Director
Division of Undergraduate Education
National Science Foundation
Divisions within EHR Directorate

- **Division of Graduate Education (DGE)**
  - James H. Lightbourne, Division Director
  - 703.292.8630

- **Division of Human Resource Development (HRD)**
  - Muriel Poston, Division Director
  - 703.292.8640

- **Division of Research on Learning in Formal & Informal Settings (DRL)**
  - John Cherniavsky
  - Acting Division Director
  - 703.292.8620

- **Division of Undergraduate Education (DUE)**
  - Katherine Denniston, Acting Division Director
  - 703.292.8670

**National Science Foundation**

Division of Undergraduate Education (DUE)
What are Rotators?

- Scientists, engineers and educators on temporary assignment from academia, industry or other organizations to further the agency's mission.

- Serve to strengthen NSF's ties with the research and education communities and provide critical talent and resources.

- Rotator assignments usually run 1–2 years.

- Some rotators assigned under the Intergovernmental Personnel Act (IPA) authority may remain up to 4 years.

- [www.nsf.gov/about/career_opps/rotators](http://www.nsf.gov/about/career_opps/rotators)
Benefits of Being a Rotator

- Enhance your own research and educational innovations
- Increase understanding of the NSF proposal development and review process
- Gain a more multi-disciplinary lens
- Develop leadership skills
- Interface with the research and education communities at national and global levels
- Mentor the next generation of S&E leaders

National Science Foundation
Division of Undergraduate Education (DUE)
NSF Annual Budget (~ $7 Billion in FY 2012)

~20% of the total federal budget for basic research conducted at U.S. colleges and universities.

This share increases to ~60% when medical research supported by the National Institutes of Health is excluded.
# Programs in DUE Likely to Fund Projects in Two-Year Colleges

<table>
<thead>
<tr>
<th>Program</th>
<th>FY 2010</th>
<th>FY 2011</th>
<th>FY 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATE</td>
<td>$64</td>
<td>$64</td>
<td>$64</td>
</tr>
<tr>
<td>CCLI/TUES</td>
<td>$63</td>
<td>$63</td>
<td>$63</td>
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<tr>
<td>STEP</td>
<td>$30</td>
<td>$30</td>
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<tr>
<td>S-STEM</td>
<td>$75-100/year from H1B visa fee</td>
<td>$75-100/year from H1B visa fee</td>
<td>$75-100/year from H1B visa fee</td>
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<tr>
<td>NOYCE</td>
<td>$55</td>
<td>$55</td>
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<tr>
<td>MSP</td>
<td>$58</td>
<td>$58</td>
<td>$58</td>
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</tbody>
</table>

*(in Millions)*
Fiscal Year 2011 Funding Rates in EHR Directorate

FY 2011 EHR Funding Rate for All Grants

Overall EHR Funding Rate: 17%

DGE 10%
DRL 12%
DUE 19%
HRD 31%

Actions Awards

About Funding Rates
Funding Rates Comparison with MPS Directorate

**FY 2011 MPS Funding Rate for Research Grants**

Overall MPS Funding Rate: 25%

- **AST**: 20%
- **CHE**: 21%
- **DMR**: 19%
- **DMS**: 30%
- **PHY**: 32%

About Funding Rates
Navigating to the EHR Directorate

National Science Foundation
Division of Undergraduate Education (DUE)
Onward to the Division of Undergraduate Education
DUE Mission: To promote excellence in undergraduate science, technology, engineering and mathematics (STEM) education for all students.
Programs and Funding Opportunities

Key: ☐ Crosscutting | ☐ NSF-wide

Advanced Technological Education (ATE)

Cooperative Activity with Department of Energy Programs for Education and Human Resource Development (Request for Supplement) ☐

CyberCorps: Scholarship for Service (SFS)

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)

Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring

Robert Noyce Teacher Scholarship Program

Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)

Science, Technology, Engineering, and Mathematics Talent Expansion Program Centers (STEP Centers) ☐

Secure and Trustworthy Cyberspace (SaTC)

Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (TUES)

Featured NSF-wide Programs

View All NSF-wide Programs

NSF Educational Opportunities by Audience

For Undergraduate Students
Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics

CCLI Program is now TUES

The Course, Curriculum and Laboratory Improvement Program (CCLI) has changed to Transforming Undergraduate Education in Science (TUES). Please see the new solicitation http://www.nsf.gov/publications/cub_summ.jsp?WT.z_pims_id=57415odf_key=nsf10544

CONTACTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don L. Millard</td>
<td><a href="mailto:dmillard@nsf.gov">dmillard@nsf.gov</a></td>
<td>(703) 292-4620</td>
<td>835 N</td>
</tr>
<tr>
<td>Nyles Boylan</td>
<td><a href="mailto:nboylan@nsf.gov">nboylan@nsf.gov</a></td>
<td>(703) 292-4617</td>
<td>835 N</td>
</tr>
<tr>
<td>Susan Finger</td>
<td><a href="mailto:sfinger@nsf.gov">sfinger@nsf.gov</a></td>
<td>(703) 292-4639</td>
<td>835 N</td>
</tr>
<tr>
<td>Richard W. Paterson</td>
<td><a href="mailto:npaterson@nsf.gov">npaterson@nsf.gov</a></td>
<td>(703) 292-4620</td>
<td>835 N</td>
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<tr>
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<td><a href="mailto:rpinnel@nsf.gov">rpinnel@nsf.gov</a></td>
<td>(703) 292-4618</td>
<td>835 N</td>
</tr>
<tr>
<td>Terry Woodin</td>
<td><a href="mailto:twoodin@nsf.gov">twoodin@nsf.gov</a></td>
<td>(703) 292-4657</td>
<td>835 N</td>
</tr>
</tbody>
</table>

Proposers are encouraged to contact a DUE Program Director in their discipline:

Biological Sciences

- V. Celeste Carter, Program Director, telephone: (703)292-4551, email: vccarter@nsf.gov
- Kathleen Bergin, Program Director, telephone: (703)292-5171, email: kbergin@nsf.gov
- James Hamos, Program Director, telephone: (703)292-4687, email: jhamos@nsf.gov
Where are details of the TUES Program Found?

What has the TUES Program Funded?
<table>
<thead>
<tr>
<th>Award Number</th>
<th>Title</th>
<th>NSF Organization</th>
<th>Program(s)</th>
<th>Start Date</th>
<th>Principal Investigator</th>
<th>State</th>
<th>Organization</th>
<th>Awarded Amount to Date</th>
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<tbody>
<tr>
<td>1242325</td>
<td>CCLI-Type 1: Integrating Sustainability into the Civil Engineering Curriculum Through Three Courses</td>
<td>DUE</td>
<td>CCLI-Type 1 (Exploratory); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>01/01/2012</td>
<td>Landis, Amy</td>
<td>AZ</td>
<td>Arizona State University</td>
<td>$53,071.00</td>
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<td>1156450</td>
<td>ChemPREP: Illustrating Chemistry Concepts with Multiple Contexts</td>
<td>DUE</td>
<td>CCLI-Type 1 (Exploratory); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>12/01/2011</td>
<td>Moore, John</td>
<td>WI</td>
<td>University of Wisconsin-Madison</td>
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<td>1262380</td>
<td>Collaborative Research: Developing a Collaborative Research Environment for Undergraduate Engineering Students</td>
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<td>CCLI-Type 1 (Exploratory); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>08/15/2011</td>
<td>Savio, Eleanor</td>
<td>KS</td>
<td>Kansas State University</td>
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<td>1145569</td>
<td>Collaborative Research: Authoring tool for a handson, online, lab curriculum for engineering technology students</td>
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<td>CCLI-Type 1 (Exploratory)</td>
<td>04/01/2011</td>
<td>Bichel, Enid</td>
<td>MA</td>
<td>Five Colleges Inc</td>
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<td>1035306</td>
<td>Collaborative Proposal: Problem-Based Learning of Multithreaded Programming in Medical Engineering: Cultivating Clinical Competence</td>
<td>DUE</td>
<td>CCLI-Type 1 (Exploratory)</td>
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<td>Zhang, Wei</td>
<td>VA</td>
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<td>1053566</td>
<td>Collaborative Proposal: Problem-Based Learning of Multithreaded Programming in Medical Engineering: Cultivating Clinical Competence</td>
<td>DUE</td>
<td>CCLI-Type 2 (Expansion); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>12/15/2010</td>
<td>Downey, Gary</td>
<td>VA</td>
<td>Virginia Polytechnic Institute and State University</td>
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<td>1051142</td>
<td>Exploring Student-Based Learning in Chemical Engineering Education</td>
<td>DUE</td>
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<td>Zollars, Richard</td>
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<td>0941978</td>
<td>Cyber PTL (CPTL): Development, Implementation, and Evaluation</td>
<td>DUE</td>
<td>CCLI-Type 1 (Exploratory); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>12/01/2010</td>
<td>Varma-Nelson, Pratibha</td>
<td>IN</td>
<td>Indiana University</td>
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<td>1024443</td>
<td>Extending CREATE: Demographically and Geographically to Test Its Effectiveness on Diverse Populations of Learners at 4 Year and 2 Year Institutions</td>
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<td>CCLI-Type 2 (Expansion); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>12/01/2010</td>
<td>Hosking, Sally</td>
<td>NY</td>
<td>CUNY City Colleges</td>
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<td>0942970</td>
<td>Development of an Interdisciplinary Course: Chemical Analysis in Chemical Ecology</td>
<td>DUE</td>
<td>CCLI-Type 1 (Exploratory); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>12/01/2010</td>
<td>Arnold, Thomas</td>
<td>PA</td>
<td>Dickinson College</td>
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<td>1118424</td>
<td>Collaborative Research: Hands-on exercises on DETER textbook for security education</td>
<td>DUE</td>
<td>CCLI-Type 2 (Expansion)</td>
<td>12/01/2010</td>
<td>Kana, Brent</td>
<td>VA</td>
<td>George Mason University</td>
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<td>0942823</td>
<td>Collaborative Research: Increasing Conceptual Understanding through Animation Visualization</td>
<td>DUE</td>
<td>CCLI-Type 1 (Exploratory); S-STEM/SCHLR SCI TECH ENG/MATH</td>
<td>10/01/2010</td>
<td>Canawardena, Ananda</td>
<td>PA</td>
<td>Carnegie-Mellon University</td>
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<td>1039958</td>
<td>Collaborative Research: Networked Collaboration Model for Integrating Mathematics and Engineering Education</td>
<td>DUE</td>
<td>CCLI-Type 2 (Expansion)</td>
<td>10/01/2010</td>
<td>Beath, Jack</td>
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<td>Carnegie-Mellon University</td>
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</table>
Example of an Award Abstract Page

ChemPRIME: Illustrating Chemistry Concepts with Multiple Contexts

**NSF Org:** Division of Undergraduate Education

**Initial Amendment Date:** December 15, 2011

**Latest Amendment Date:** April 17, 2012

**Award Number:** 1156433

**Award Instrument:** Standard Grant

**Program Manager:** Pamela Brown
Division of Undergraduate Education

**Start Date:** December 1, 2011

**Expires:** November 30, 2012 (Estimated)

**Awarded Amount to Date:** $225,359

**Investigator(s):** John Moore jmoore@chem.wisc.edu (Principal Investigator)

**Sponsor:** University of Wisconsin-Madison
21 North Park Street
Madison, WI 53715 608/262-3622

**NSF Program(s):** CCLI-Type 1 (Exploratory), S-STEM/SHLR SCI TECH ENGMATH

**Program Reference Code(s):** SMET, 9170

**Program Element Code(s):** 7494, 1536

**ABSTRACT**

ChemPRIME (Chemical Principles through Integrated Multiple Exemplars) Program is developing an approach to learning chemistry that presents concepts in a logically developed order common to many popular texts, but allows students to choose from a wide variety of Exemplars, or subject-specific examples that illustrate the concepts, arranged in Tracks that run through the entire course. ChemPRIME applies the tools of chemistry to issues or subjects that students are interested in.

ChemPRIME retains the advantages, and sheds the disadvantages, of previous approaches to teaching chemistry, by retaining the hierarchical development of theory while allowing students to choose cases or applications of the theory that motivate them to learn. This project is developing exemplars for most of the concepts included in a typical general chemistry course spanning tracks like Geology; Physics/Astronomy; Engineering; Everyday Products; Sports; Physiology and Health; Biological Science; Liberal Arts; Environment and Forensics. ChemPRIME offers an opportunity to integrate founder developments in chemistry into the curriculum while reflecting the field’s increasing contributions to other disciplines.

ChemPRIME is being developed as a Mediawiki text in combination with the course management system Moodle®. Both Mediawiki® and Moodle® are open source, making the project readily available and adaptable by others. ChemPRIME will be disseminated through the Chemical Education Digital Library, a Pathway in the National Science Digital Library, and will draw upon and contribute to the various disciplines designated as NSDL Pathways. The ChemPRIME design invites all users to contribute exemplars from their fields of expertise or interest.

**PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH**

Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (TUES) Course, Curriculum, and Laboratory Improvement (CCLI)

PROGRAM SOLICITATION
NSF 10-544

REPLACES DOCUMENT(S):
NSF 09-529

National Science Foundation
Directorate for Education & Human Resources
Division of Undergraduate Education
TUES

Vision
Excellent STEM education for all undergraduate students

Goal
Stimulate, disseminate, and institutionalize innovative developments in STEM education through the production of knowledge and the improvement of practice.

*Most comprehensive program
TUES Project Components

* Creating Learning Materials and Strategies:
  - Guided by research on teaching and learning
  - Incorporate and be inspired by advances within the discipline

* Implementing New Instructional Strategies:
  - Contribute to understanding on how existing strategies can be widely adopted
    Are transferred to diverse settings
    Impact student learning in diverse settings
TUES Project Components

* Developing Faculty Expertise:
  - Enable faculty to acquire new knowledge and skills in order to revise their curricula and teaching practices
  - Involve a diverse group of faculty

* Assessing and Evaluating Student Achievement:
  - Develop and disseminate valid and reliable tests of STEM knowledge
  - Collect, synthesize, and interpret information about student understanding, reasoning, practical skills, interests, attitudes or other valued outcomes
TUES Project Components

* Conducting Research on Undergraduate STEM Education:
  - Explore how
    a) Effective teaching strategies and curricula enhance learning and attitudes
    b) Widespread practices have diffused through the community
    c) Faculty and programs implement changes in their curriculum
Project Types

Type 1: Total budget up to $200,000 for 2 to 3 years
   $250,000 when 4-year and 2-year institutions collaborate

Type 2: Total budget up to $600,000 for 2 to 4 years

Type 3: Budget negotiable but not to exceed $5M over 5 years
Advanced
Technological
Education
(ATE)

PROGRAM SOLICITATION NSF 11-692
ATE

*Goal: Educate technicians for the high-tech fields that drive our nation’s economy

*Sample activities:
  - Curriculum and program development
  - Faculty professional development
  - Building career pathways
ATE

ATE is in its 19th year of funding community colleges, having started with the Science and Advanced Technology Act of 1992 (SATA).

Next Proposal Deadline: October 17, 2013
ATE Tracks

*Projects

- Program improvement
- Professional development for educators
- Curriculum and educational materials development
- Teacher preparation
- Small grants to new awardees**
Small Grants

- Focus on community colleges that have little or no previous ATE grant experience (none in past 10 years)

- Designed to stimulate implementation, adaptation, and innovation in technological education
Science, Technology, Engineering and Mathematics Talent Expansion Program (STEP)

PROGRAM SOLICITATION NSF 11-550
STEP

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)
STEP Tracks

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 - Type 1

*Possible project activities:

- Focus directly on student learning
- Incorporate current technology
- Develop interdisciplinary approaches
- Offer bridge programs

Note: Increases in a particular field must not be at the expense of other fields!
Scholarships in Science, Technology, Engineering, and Mathematics

(S-STEM)

Program Solicitation NSF 12-529
S-STEM

Goal

Provides institutions funds to award scholarships to academically talented, but financial needy, students. Students can be pursuing associate, baccalaureate, or graduate degrees.

Next Proposal Deadline: August 13, 2013
S-STEM

*Eligible disciplines include biology, physical and mathematical sciences, computer and information sciences, geosciences and engineering

*Maximum scholarships $10,000 (based on financial need)

*Grant size: up to $600,000 (direct charges)

*One proposal per constituent school or college
Robert Noyce
Teacher Scholarship Program

PROGRAM SOLICITATION: NSF 11-517
Noyce Program

*Initiated by Act of Congress in 2002
*Reauthorized in 2007 (America COMPETES Act)

- To encourage talented mathematics, science, and engineering undergraduates to pursue teaching careers
- To encourage STEM professionals to become teachers
- To prepare Master Teachers
Noyce Program

*Track 1: Robert Noyce Teacher Scholarships*

**Phase 1**

- STEM summer internships including early field experiences for freshmen and sophomores
- STEM undergraduate majors: up to 3 years of scholarship support (junior year through 5th year credentialing program)
Noyce Program

*Track 1: Robert Noyce Teacher Scholarships*

**Phase 1**

- Each year of support = 2 year teaching commitment in high need school district
- At least $10K/year for scholarship or stipend, but capped at the cost of attendance
- STEM professionals: 1 year stipend for credentialing program
Noyce Program

*Track 1: Robert Noyce Teacher Scholarships*

**Phase 1**

- Max institutional award: $1.2M over 5 years
- No indirect costs allowed
- At least 80% of total budget must be for direct participant support
- Collaboration between 4-year institutions and 2-year institutions may request additional $250K in total budget
Questions?
and
Thank you!

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Dave Brown – drbrow@nsf.gov