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Envisioning the Future of Undergraduate STEM Education: 
Research and Practice

Symposium Program Book

April 27-29, 2016
Hyatt Regency on Capitol Hill

Co-hosted by
American Association for the Advancement of Science (AAAS) Education and Human Resources Programs (EHR) and National Science Foundation (NSF) Division of Undergraduate Education (DUE)
Overview of the Symposium

Envisioning the Future of Undergraduate STEM Education (EnFuse): Research and Practice Symposium

The American Association for the Advancement of Science (AAAS) and the National Science Foundation’s Division of Undergraduate Education are hosting the symposium on Envisioning the Future of Undergraduate STEM Education (EnFuse): Research and Practice on April 27-29, 2016 in Washington, DC. This will be an opportunity to actively network and learn from NSF program officers and faculty engaged in improving undergraduate education.

This symposium will highlight the research, findings, and effective practices of NSF grantees from the following programs:

- Improving Undergraduate STEM Education: Education and Human Resources (IUSE:EHR);
- Improving Undergraduate STEM Education: Pathways into Geoscience (IUSE:GEOPATHS);
- Improving Undergraduate STEM Education/Professional Formation of Engineers: Revolutionizing Engineering Departments (IUSE/PFE: RED);
- Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics (TUES);
- Course, Curriculum, and Laboratory Improvement (CCLI);
- Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP);
- Widening Implementation & Demonstration of Evidence-Based Reforms (WIDER);
- EHR Core Research (ECR); and
- Nanotechnology Undergraduate Education (NUE) in Engineering.

Symposium Structure

The Symposium will include the following:

1. Plenary Lectures and Panels: Distinguished scholars will be invited to inspire and help transform the community.
2. Poster Sessions: Sessions to bring together the community and share knowledge. Poster should be no more than 4 feet by 4 feet.
3. Discussion Sessions: Sessions that include two or more PIs presenting on and responding to questions about challenges and contributions from their specific projects.
4. Working Group Sessions: Sessions where participants meet and discuss challenges and opportunities on a specific topic.
5. Paper Presentation Sessions: Conference-style sessions that bring PIs together around specific themes. Each PI will have 20 minutes (10 minutes for the presentation and 10 minutes for Q&A).

NSF Program Officer Sessions: Sessions to support PIs in managing their current projects and preparing for the next one.

Presentations will focus on (a) institutional transformation, (b) student learning, (c) learning technologies and context, and (d) broadening participation.
The American Association for the Advancement of Science (AAAS)

The American Association for the Advancement of Science is an international non-profit organization dedicated to advancing science around the world by serving as an educator, leader, spokesperson and professional association. In addition to organizing membership activities, AAAS publishes the journal Science, http://www.sciencemag.org/, as well as many scientific newsletters, books and reports, and spearheads programs that raise the bar of understanding for science worldwide.

AAAS was founded in 1848, and includes some 261 affiliated societies and academies of science, serving 10 million individuals. Science has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of one million. The non-profit AAAS is open to all and fulfills its mission to "advance science and serve society" through initiatives in science policy; international programs; science education; and more. For the latest research news, log onto EurekAlert!, http://www.eurekalert.org/, the premier science-news website, a service of AAAS.

Membership and Programs

Open to all, AAAS membership includes a subscription to Science. Four primary program areas fulfill the AAAS mission:

- Science and Policy
- International Activities
- Education and Human Resources
- Project 2061

AAAS Mission

AAAS seeks to "advance science, engineering, and innovation throughout the world for the benefit of all people." To fulfill this mission, the AAAS Board has set these broad goals:

- Enhance communication among scientists, engineers, and the public;
- Promote and defend the integrity of science and its use;
- Strengthen support for the science and technology enterprise;
- Provide a voice for science on societal issues;
- Promote the responsible use of science in public policy;
- Strengthen and diversify the science and technology workforce;
- Foster education in science and technology for everyone;
- Increase public engagement with science and technology; and
- Advance international cooperation in science.

Visit the AAAS website at http://www.aaas.org/.
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   Yolanda S. George, Deputy Director

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   Betty Calinger
   Tarrick Clayton
   Nicole Davies
   Janaya Thompson

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   Elise Swinehart, Director of Marketing

TECHNOLOGY TEAM | PONGOS INTERACTIVE
   Chrissy Rey-Drapeau, Pongos Interactive
   Christi Loya, Pongos Interactive
   Michael Dance, Pongos Interactive
## Agenda

### Wednesday, April 27, 2016

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<td>Speed Meeting Facilitators:</td>
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<td>Regency Foyer</td>
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<td></td>
<td>Lidia Yoshida, <em>Program Director</em>, NSF</td>
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<td></td>
<td>Brent Driscoll, <em>Science Assistant</em>, NSF</td>
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<td></td>
<td>Kristofer Pachla, <em>Science Assistant</em>, NSF</td>
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<td></td>
<td>Emily Sheehan, <em>Science Assistant</em>, NSF</td>
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<tr>
<td>2:30 pm – 3:45 pm</td>
<td>Sessions While You Wait for Speed Meeting Appointment - Session 1</td>
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<td>Division of Grants and Agreements</td>
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<tr>
<td></td>
<td>Rashawn Farrior, <em>Grant Specialist</em>, NSF</td>
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<td>Denise Martin, <em>Team Lead</em>, NSF</td>
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<td>Assessment and Evaluation</td>
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<td>Ann Austin, <em>Program Director</em>, NSF</td>
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<td>4:00 pm – 5:15 pm</td>
<td>Sessions While You Wait for Speed Meeting Appointment - Session 2</td>
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<td></td>
<td>Kevin Lee, <em>Program Director</em>, NSF</td>
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<td>Joyce Evans, <em>Program Director</em>, NSF</td>
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<td>Theory-Driven and Evidence-Based Continuous Improvement in STEM</td>
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<td>Education</td>
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<td></td>
<td>Abby Ilumoka, <em>Program Director</em>, NSF</td>
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<td>Olga Pierrakos, <em>Program Director</em>, NSF</td>
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<td>Ece Yaprak, <em>Program Director</em>, NSF</td>
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<tr>
<td>2:30 pm – 5:15 pm</td>
<td>Speed Meeting Rooms</td>
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<td>1. IUSE:EHR - Biology</td>
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<td><em>Olympic, 2nd Floor</em></td>
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<td>2. IUSE:EHR - Chemistry</td>
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<td>2:30 pm – 5:15 pm</td>
<td>3. IUSE:EHR - Computer Science</td>
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<td>2:30 pm – 5:15 pm</td>
<td>4. IUSE:EHR - Engineering</td>
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<td>2:30 pm – 5:15 pm</td>
<td>5. IUSE:EHR - Geosciences and IUSE:Geopaths</td>
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<td><em>Yosemite, 2nd Floor</em></td>
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<td>2:30 pm – 5:15 pm</td>
<td>6. IUSE:EHR - Institutional and Community Transformation</td>
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<td>2:30 pm – 5:15 pm</td>
<td>7. IUSE:EHR - Interdisciplinary</td>
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<td>2:30 pm – 5:15 pm</td>
<td>8. IUSE:EHR - Mathematics</td>
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<td>9. IUSE:EHR - Physics and Astronomy</td>
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<td>10.B. IUSE:EHR - Research and Assessment</td>
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<td>10.C. IUSE:EHR - Teacher Preparation</td>
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<td>2:30 pm – 5:15 pm</td>
<td>11.A. ATE Advancing Technological Education</td>
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<td>11.B. Robert Noyce Teacher Scholarship Program</td>
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<td>2:30 pm – 5:15 pm</td>
<td>12.A. ECR: EHR Core Research</td>
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<td>12.B. Cybercorps®: Scholarship for Service (SFS)</td>
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<td>2:30 pm – 5:15 pm</td>
<td>13.A. IUSE/PFE: REvolutionizing Engineering and Computer Science</td>
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<td>Departments (RED)</td>
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<td>2:30 pm – 5:15 pm</td>
<td>13.B. NUE: Nanotechnology Undergraduate Education in Engineering</td>
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<td>2:30 pm – 5:15 pm</td>
<td>13.C. IUSE Research in the Formation of Engineers (RFE)</td>
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<td>2:30 pm – 5:15 pm</td>
<td>13.D. Broadening Participation in Engineering (BFE)</td>
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<td>2:30 pm – 5:15 pm</td>
<td>14.A. HBCU-UP: Historically Black Colleges and Universities</td>
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<td>Time</td>
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<td>2:30 pm – 5:15 pm</td>
<td><strong>14.B. LSAMP: Louis Stokes Alliance for Minority Participation</strong>&lt;br&gt;<strong>14.C. TCUP: Tribal Colleges and Universities Program</strong>&lt;br&gt;&lt;br&gt;<strong>Thornton B, 11th Floor</strong></td>
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<tr>
<td>5:45 pm – 7:00 pm</td>
<td><strong>Plenary Session 1</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Welcome and Moderator:</strong>&lt;br&gt;Lee Zia, Deputy Division Director, Division of Undergraduate Education, NSF&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Plenary Introduction:</strong>&lt;br&gt;Joan Ferrini-Mundy, Assistant Director, Education and Human Resources Directorate, NSF&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Speaker:</strong>&lt;br&gt;Jo Handelsman, Associate Director for Science at the White House Office of Science and Technology Policy</td>
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<td>6:00 pm – 7:15 pm</td>
<td><strong>Poster Setup</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;Regency Foyer&lt;br&gt;Columbia Foyer&lt;br&gt;Columbia A/B/C&lt;br&gt;Concord/Lexington/Bunker Hill</td>
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<td>7:15 pm – 9:15 pm</td>
<td><strong>Poster Session 1 and Reception</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;Regency Foyer&lt;br&gt;Columbia Foyer&lt;br&gt;Columbia A/B/C&lt;br&gt;Concord/Lexington/Bunker Hill</td>
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<td>7:00 am – 7:30 am</td>
<td><strong>Registration</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;Regency Foyer</td>
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<td>7:30 am – 9:00 am</td>
<td><strong>Plenary Session 2 and Breakfast</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Moderator and Welcome:</strong>&lt;br&gt;Jim Lewis, Deputy Assistant Director, Education and Human Resources Directorate, NSF&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>Speaker:</strong>&lt;br&gt;France A. Córdova, Director, NSF</td>
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<tr>
<td>9:00 am – 9:15 am</td>
<td><strong>Break</strong></td>
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<td>9:15 am – 10:35 am</td>
<td><strong>Concurrent Paper Presentations - Session A</strong>&lt;br&gt;&lt;br&gt;&lt;br&gt;&lt;br&gt;<strong>A1. Faculty Adoption of Evidence-Based Practices</strong>&lt;br&gt;Bryce, 2nd Floor</td>
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<td>9:15 am – 10:35 am</td>
<td><strong>A2. Meeting Engineering Workforce Demands</strong>&lt;br&gt;Everglades, 2nd Floor</td>
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<td>9:15 am – 10:35 am</td>
<td><strong>A3. Transforming Computer Science Instructional Practices</strong>&lt;br&gt;Yellowstone, 2nd Floor</td>
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<td>9:15 am – 10:35 am</td>
<td><strong>A4. Collaborative Solutions</strong>&lt;br&gt;Sequoia, 2nd Floor</td>
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<td>9:15 am – 10:35 am</td>
<td><strong>A5. Assessment of Instructional Practices</strong>&lt;br&gt;Yosemite, 2nd Floor</td>
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<td>9:15 am – 10:35 am</td>
<td><strong>A6. Assessing Engineering Student Learning</strong>&lt;br&gt;Capitol A, Lobby Level</td>
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<td><strong>BROADENING PARTICIPATION</strong></td>
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<td>Digital Tools in Engineering Education</td>
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**Agenda**

10:35 am – 10:50 am | Break

10:50 am – 12:20 pm | Concurrent Paper Presentations - Session B
Agenda

B12. Digital Tools for Biological Science Learning
Congressional B, Lobby Level

B13. Increasing STEM Retention by Improving Success in Calculus
Thornton C, 11th Floor

B14. Recruiting and Retaining a Diverse STEM Student Population
Thornton B, 11th Floor

B15. Broadening the Engineering Student Population
Thornton A, 11th Floor

12:20 pm – 1:50 pm
Plenary Session 3 - Working Lunch
Regency Ballroom

Welcome and Moderator:
Gül Kremer, Program Director, NSF

Plenary Introduction:
Myles Boylan, Lead Program Director, NSF

Speaker:
Richard Wiener, Senior Program Director, Research Corporation for Science Advancement

1:50 pm – 2:05 pm
Break

2:05 pm – 3:25 pm
PI-Led Discussion Groups

C1. Supporting Authentic Undergraduate Research
Bryce, 2nd Floor

C2. Broadening Participation: Students, Faculty and Institutions
Congressional B, Lobby Level

C3. Digital Teaching Tools
Yellowstone, 2nd Floor

C4. Cultivating Pathways to Success in Undergraduate STEM Education: Innovations in Research Methods
Thornton A, 11th Floor

C5. Evaluation and Assessment
Congressional C/D, Lobby Level

C6. Building a Faculty Development Toolbox
Regency D, Ballroom Level

C7. Inquiry and Problem-Based Instruction Across the Disciplines
Thornton C, 11th Floor

C8. Building, Sustaining, and Evaluating Networks for Change in STEM Education
Congressional A, Lobby Level

C9. Challenges and Opportunities of STEM Online Education
Yosemite, 2nd Floor

C10. Facilitating Organizational Change
Everglades, 2nd Floor

C11. Project Management
Grand Teton, 2nd Floor

C12. Evidence-Based STEM Instruction: Practices and Challenges
Capitol B, Lobby Level

C13. Student Success and Engagement
Thornton Lounge, 11th Floor

C14. Technology-Based Engineering Education: Hands-On Experiences
Capitol A, Lobby Level

C15. Preparing Students for the 21st Century Workforce
Thornton B, 11th Floor

3:25 pm – 3:40 pm
Break

3:40 pm – 5:00 pm
Plenary Session 4 - Priorities and Challenges in STEM Workforce Development
Regency Ballroom

Welcome and Introduction:
Susan Singer, Division Director, Division of Undergraduate Education, NSF

Moderator:
Joan Ferrini-Mundy, Assistant Director, Education and Human Resources Directorate, NSF
Symposium Program Book

ENVISIONING THE FUTURE OF UNDERGRADUATE STEM EDUCATION

Fay L. Cook, Assistant Director, Social, Behavioral and Economic Sciences, NSF

M. Brandon Jones, Program Director, Education and Diversity, Geosciences, NSF

Pramod Khargonekar, Assistant Director, Engineering, NSF

James F. Kurose, Assistant Director, Computer and Information Science and Engineering, NSF

Jennifer Slimowitz Pearl, Deputy Division Director (Acting), Mathematical and Physical Sciences, NSF

Jane Silverthorne, Deputy Assistant Director, Biological Sciences Directorate, NSF

5:00 pm – 5:15 pm Break

5:15 pm – 6:45 pm Poster Session 2
Regency Foyer
Columbia Foyer
Columbia A/B/C
Concord/Lexington/Bunker Hill

6:45 pm – 7:00 pm Remove Posters
Dinner on Your Own

Friday, April 29, 2016

7:00 am – 8:00 am Networking Session 1 and Breakfast
Regency Ballroom

8:00 am – 9:20 am PI-Led Working Groups

D1. Strategies for Fostering Undergraduate Research and Design
Lexington, Ballroom Level

D2. Broadening Participation: Getting Beyond Grants to Institutional Change with Revolutionary Evidence-Based Methods
Bryce, 2nd Floor

D3. Curriculum Development
Columbia C/D, Ballroom Level

D4. Digital Teaching Tools: Best Practices, Challenges and Opportunities
Yellowstone/Everglades, 2nd Floor

D5. Making Change Happen: Promoting Productive Use of Evidence-Based Practices
Concord, Ballroom Level

D6. Evaluation and Assessment
Columbia A, Ballroom Level

D7. Working Group on Faculty Instructional Development
Regency D, Ballroom Level

D8. Educational Innovation Through Online Learning and Global Collaboration
Glacier, 2nd Floor

D9. Navigating the Landscape for Organizational Change
Columbia B, Ballroom Level

D10. Harnessing the Beast: Managing Your Project Before, During, and After Yosemite, 2nd Floor

D11. Rising to the Challenge: Strategies for Improving STEM Instruction
Capitol B, Lobby Level

D12. Student Success and Engagement
Capitol A, Lobby Level

D13. Teacher Preparation and Professional Development That Supports Interdisciplinary STEM Teaching and Learning
Grand Teton, 2nd Floor

9:20 am – 9:30 am Break

9:30 am – 10:45 am Concurrent NSF Program Director Sessions

E1. IUSE: EHR-Engaged Student Learning
Columbia B, Ballroom Level
Agenda

NSF Program Directors: John Haddock and Teri Murphy

E2. IUSE: EHR-Institutional and Community Transformation
Columbia A, Ballroom Level

NSF Program Director: Myles Boylan

E3. IUSE: GEOPATHS
Columbia C, Ballroom Level

NSF Program Directors: Amanda Adams, M. Brandon Jones, Lina Patino, and Lisa Rom

E4. Research Coordination Networks: Undergraduate Biology Education (RCN-UBE)
Capitol A, Lobby Level

NSF Program Directors: Ellen Carpenter, Christopher Meyer, and Julio Soto

E5. IUSE/PFE: RED & Research in the Formation of Engineers (RFE)
Capitol B, Lobby Level

NSF Program Director: Elliot Douglas

E6. Advance Technology Education (ATE)
Congressional A, Lobby Level

NSF Program Directors: Celeste Carter and Thomas Higgins

E7. Broadening Participating In Engineering (BPE)
Congressional B, Lobby Level

NSF Program Director: James Moore

E8. Cybercorps®: Scholarship for Service (SFS)
Grand Teton, 2nd Floor

NSF Program Directors: Michael Erlinger and Victor Piotrowski

E9. EHR Core Research (ECR)
Yosemite, 2nd Floor

NSF Program Director: Dawn Rickey and Margret Hjalmarson

E10. Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)
Yellowstone, 2nd Floor

NSF Program Director: Claudia Rankins

E11. I-Corps for Learning
Glacier, 2nd Floor

NSF Program Directors: Karen Crosby and John Krupczak

E12. International Research Experiences for Students (IRES)
Bunker Hill, Ballroom Level

NSF Program Director: Graham Harrison

E13. Louis Stokes Alliances for Minority Participation (LSAMP)
Everglades, 2nd Floor

NSF Program Director: A. James Hicks

E14. Research Experiences for Undergraduate (REU)
Concord, Ballroom Level

NSF Program Directors: Amanda Adams, Corby Hovis, and Lina Patino

E15. The Future of STEM Education: Undergraduate Education’s Critical Importance to Teacher Preparation (Noyce + IUSE = Success)
Regency D, Ballroom Level

NSF Program Directors: Kathleen Bergin and Sandra Richardson
E16. Scholarships in STEM (S-STEM)
Lexington, Ballroom Level

NSF Program Directors:
Connie Della-Piana, Paul Tymann, and Yvette Weatherton

E17. Tribal Colleges and University Programs (TCUP)
Bryce, 2nd Level

NSF Program Director:
Jody Chase and Rebecca Chase

10:45 am – 11:00 am Break

11:00 am – 12:30 pm Plenary Session 5
Regency Ballroom

Welcome and Moderator:
Shirley M. Malcom, Director, Education and Human Resources Programs, AAAS

Symposium Observations:
Linda Slakey, Education Consultant and former Director of the Division of Undergraduate Education, NSF

Myles Boylan, Lead Program Director, NSF
AAAS SCIENCE & TECHNOLOGY POLICY FELLOWSHIPS

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— Ticora Jones, Ph.D., Executive Branch Fellow and MRS Congressional Fellow; Senior Advisor and Program Manager, U.S. Agency for International Development

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“The fellowship gave me the opportunity to be more than I thought possible.”
Myles Boylan, Lead Program Director, NSF

Since 1996, Myles Boylan has been a Program Director at the National Science Foundation (NSF) within the Directorate for Education and Human Resources. He has worked in many education programs in that directorate. In recent years he has co-led TUES (Transforming Undergraduate Education in STEM) and WIDER (focused on catalyzing institution-wide implementation of evidence-based teaching methods). After these two programs were coalesced into a broader program titled Improving Undergraduate STEM Education (IUSE) in 2014, he has led this new program in its EHR version: IUSE: EHR.

Myles’ doctoral work was in industrial economics. He held a variety of academic appointments before joining the NSF in 1984. His academic research focused on the process and diffusion of technological innovation in private industry and he continues to work through NSF to accelerate the diffusion of proven teaching methods and institutional change.

France A. Córdova, Director, NSF

France A. Córdova, was sworn in as director of the National Science Foundation (NSF) on March 31, 2014. Nominated by President Barack Obama to head the $7.2-billion independent federal agency, she was confirmed by the U.S. Senate on March 12th. Córdova leads the only government science agency charged with advancing all fields of scientific discovery, technological innovation, and science, technology, engineering and mathematics (STEM) education. NSF’s programs and initiatives keep the United States at the forefront of science and engineering, empower future generations of scientists and engineers, and foster U.S. prosperity and global leadership.

Córdova is president emerita of Purdue University, where she served as president from 2007 to 2012. From 2002 to 2007, she led the University of California, Riverside as chancellor and was a distinguished professor of physics and astronomy. Córdova was the vice chancellor for research and professor of physics at the University of California, Santa Barbara from 1996 to 2002. From 1993 to 1996, Córdova served as NASA’s chief scientist. Prior to joining NASA, she was on the faculty of the Pennsylvania State University where she headed the department of astronomy and astrophysics from 1989 to 1993. Córdova was deputy group leader in the Earth and Space Sciences Division at Los Alamos National Laboratory from 1988 to 1989 and staff scientist from 1979 to 1989. She received her Bachelor of Arts degree from Stanford University and her doctorate in physics from the California Institute of Technology in 1979. More recently, Córdova served as chair of the Board of Regents of the Smithsonian Institution and on the board of trustees of Mayo Clinic. She also served as a member of the National Science Board (NSB), where she chaired the Committee on Strategy and Budget. As NSF director, she is an ex-officio member of the NSB.

Córdova’s scientific contributions have been in the areas of observational and experimental astrophysics, multi-spectral research on x-ray and gamma ray sources and space-borne instrumentation. She has published more than 150 scientific papers. In 1997, she was awarded an honorary doctorate by Loyola Marymount University, Los Angeles. She is a recipient of NASA’s highest honor, the Distinguished Service Medal, and was recognized as a Kilby Laureate in 2000. The Kilby International Awards recognize extraordinary individuals who have made “significant contributions to society through science, technology, innovation, invention and education.” Córdova was elected to the American Academy of Arts and Sciences and is a National Associate of the National Academies. She is also a fellow of the American Association for the Advancement of Science (AAAS) and the Association for Women In Science (AWIS). Córdova is NSF’s 14th director, succeeding Subra Suresh who stepped down in March 2013.

Joan Ferrini-Mundy, Assistant Director, Directorate for Education and Human Resources, NSF

Joan Ferrini-Mundy is Assistant Director of the National Science Foundation (NSF) for Education and Human Resources, a position she has held since February 2011, and is responsible for the leadership of the NSF Directorate for Education and Human Resources (EHR). She had served the Foundation in a number of capacities since 2007, including as inaugural director (through an Intergovernmental Personnel Act appointment) of the EHR Directorate’s Division of Research on Learning in Formal and Informal Settings.

From 2007 through 2009, Ferrini-Mundy was a member of the National Science and Technology Council’s (NSTC) Subcommittee on Education, and currently co-chairs the Strategic Plan workgroup of the NSTC Committee on STEM Education. She is a member of the Mathematics Expert Group of the Programme for International Student Assessment (PISA), and in 2007-2008, representing NSF, she served as an ex officio member of the President’s National Mathematics Advisory Panel, and co-chaired its Instructional Practices Task Group. From 1999–2011, Ferrini-Mundy held an appointment at Michigan State University (MSU), where she was a University Distinguished Professor of Mathematics Education in the Departments of Mathematics and Teacher Education, and Associate Dean for Science and Mathematics Education in the College of Natural Science. Her research interests include calculus teaching and learning, mathematics
Biographies

teacher learning, and mathematics and science education policy at the K-12 level. Ferrini-Mundy holds a PhD in mathematics education from the University of New Hampshire. She was elected a fellow of the American Association for the Advancement of Science in 2011.

Edward F. Gehringer, Department of Computer Science, North Carolina State University

Edward Gehringer received his PhD degree in Computer Sciences from Purdue University in 1979. His PhD work was an attempt to measure the performance effects of capability-based operating systems, which were a class of operating systems to address the emerging problem of computer security. From 1979 to 1981, he was a Research Associate in the Computer Science Department at Carnegie-Mellon University, working on the distributed Cm* multiprocessor and its StarOS operating system. He is the lead author of the book written about the Cm* project. In 1981, he held a Fulbright Postdoctoral Research Fellowship at Monash University's main Clayton campus in Melbourne, Australia. He worked on the Monads project, which was an architecture and operating system providing support for modularization, information hiding, and other good software-engineering principles.

Returning to Carnegie-Mellon in 1982, he became a Lecturer in Computer Science, teaching the sophomore-level Fundamental Structures of Computer Science course, as well as Operating Systems and Comparative Programming Languages. During this time, he also began working with future Eckert-Mauchly Award winner Bob Colwell on analyzing the Intel 432 architecture.

Moving to North Carolina State University (NCSU) in 1984, with a primary appointment in Electrical and Computer Engineering (ECE) and a joint appointment in Computer Science, he worked with the B-Hive multiprocessor, which was built on an unusual generalized-hypercube topology. In 1987, he established the first NCSU course in object-oriented languages and systems, which later became CSC/ECE 517. During this time, he was also teaching Operating Systems and the course that later became Architecture of Parallel Computers. In the 1990s, he turned his attention to hardware-assisted memory management, and also garbage collection, devising a series of architectural mechanisms and co-processors to speed up automatic memory management. He also began teaching the Computer Science department’s Ethics in Computing course, and in 1996, originated the Ethics in Computing Web site ethics.csc.ncsu.edu, which later became Google’s top hit for "Ethics in Computing."

During the next decade, his primary appointment shifted to Computer Science, but he continues to teach cross-listed computer-architecture courses that have a large ECE enrollment. He also began projects in computer-supported peer review that he used in his classes and offered to other instructors. In time, they were used by thousands of students in about 20 schools. Improving the technology for this form of collaborative work has now become his main research focus. He also organized many educational workshops, such as the Workshop on Computer Architecture Education, and the OOPSLA/SPLASH Educators’ Symposium.

Yolanda S. George, Deputy Director, Education and Human Resources (EHR) Programs, AAAS

Yolanda Scott George is Deputy Director and Program Director, Education and Human Resources Programs, American Association for the Advancement of Science (AAAS). She has served as Director of Development, Association of Science-Technology Centers (ASTC), Washington, DC; Director, Professional Development Program, University of California, Berkeley; and as a research biologist at Lawrence Livermore Laboratory, Livermore, California involved in cancer research and cell cycle studies using flow cytometer and cell sorters.

George conducts evaluations, workshops and reviews for the National Institutes of Health and National Science Foundation (NSF), as well as for private foundation and public agencies, including the European Commission. She develops and coordinates conferences and workshops related to STEM undergraduate reform and recruitment and retention of minorities, women, and persons with disabilities in STEM. She works with UNIFEM, UNESCO, L’Oreal USA and Paris, and non-governmental organizations on gender, science, and technology initiatives related to college and university recruitment and retention and women leadership in STEM.

She currently serves as principal investigator (PI) or co-PI on several NSF grants, including Vision and Change in Undergraduate Biology Education; National Science Education Digital Library (NSDL) Biological Sciences Pathways; Historically Black Colleges and Universities-Undergraduate Programs (HBCU-UP); Robert Noyce Teacher Scholarship Program; Transforming Undergraduate Education in STEM (TUES) and Virtual Faculty Workshop; and Women’s International Research Collaborations at Minority Serving Institutions. In addition, George is the lead AAAS staff person for the L’Oreal USA Fellowships for Women in Science Program (postdoctoral fellowships) and the David and Lucile Packard Foundation HBCU Graduate Scholars Program (graduate school fellowships).

George serves on a number of boards or committees, including: Maria Mitchell Women in Science Awards Committee; McNeil/
Jo Handelsman, Associate Director for Science at the White House Office of Science and Technology Policy

Jo Handelsman is the Associate Director for Science at the White House Office of Science and Technology Policy (OSTP), appointed by President Obama and confirmed by the Senate in June of 2014. Handelsman helps to advise President Obama on the implications of science for the Nation, ways in which science can inform U.S. policy, and on Federal efforts in support of scientific research.

Prior to joining OSTP, Handelsman was the Howard Hughes Medical Institute Professor and Frederick Phineas Rose Professor in the Department of Molecular, Cellular and Developmental Biology at Yale University. She previously served on the University of Wisconsin-Madison faculty as a Professor in Plant Pathology from 1985 to 2009 and as Professor and Chair of the Department of Bacteriology from 2007 to 2009. In 2013, she served as President of the American Society for Microbiology.

Handelsman is an expert in communication among bacteria that associate with soil, plants, and insects and helped pioneer the field of metagenomics, bridging agricultural and medical sciences. Handelsman is also recognized for her research on science education and women and minorities in science, and received the Presidential Award for Excellence in Science Mentoring in 2011. Handelsman also co-chaired the PCAST working group that developed the 2012 report, “Engage to Excel,” which contained recommendations to the President to strengthen STEM education to meet the workforce needs of the next decade in the United States. Handelsman co-founded the Wisconsin Program for Scientific Teaching, the Yale Center for Scientific Teaching, and the National Academies Summer Institute on Undergraduate Education, programs.

Pramod P. Khargonekar was appointed by the National Science Foundation (NSF) to serve as Assistant Director for the Directorate of Engineering (ENG) in March 2013. In this position, Khargonekar leads the ENG Directorate with an annual budget of more than $890 million. The ENG Directorate invests in frontier engineering research and education, cultivates an innovation ecosystem, and develops the next-generation of engineers.

Khargonekar was Chairman of the Department of Electrical Engineering and Computer Science from 1997 to 2001 and also held the position of Claude E. Shannon Professor of Engineering Science at the University of Michigan. From 2001 to 2009, he was Dean of the College of Engineering and is currently Eckis Professor of Electrical and Computer Engineering at the University of Florida. He also served briefly as Deputy Director of Technology at ARPA-E, U.S. Department of Energy in 2012-13.

Gül E. Kremer is a Professor of Engineering Design and Industrial Engineering at The Pennsylvania State University. She received her PhD from the Department of Engineering Management and Systems Engineering of Missouri University of Science and Technology. She is a senior member of IIE, a Fellow of ASME. She was a National Research Council-US AFRL Faculty Fellow for the Human Effectiveness Directorate (2002-2004), an invited participant of the National Academy of Engineering (NAE) Frontiers in Engineering Education Symposium (2009), and a Fulbright Scholar to Ireland (2010-2011). Currently, she serves as Program Director of Division of Undergraduate Education (DUE) at the U.S. National Science Foundation (NSF).

James Kurose is the Assistant Director of the National Science Foundation (NSF) for the Computer and Information Science and Engineering (CISE). He leads the CISE Directorate, with an annual budget of more than $900 million, in its mission to uphold the nation’s leader-
Kurose is on leave from the University of Massachusetts Amherst (UMass Amherst), where he has served as Distinguished Professor at the School of Computer Science since 2004. He has also served in a number of administrative roles at UMass Amherst including Chair of the Department of Computer Science, Interim Dean and Executive Associate Dean of the College of Natural Sciences and Mathematics, and senior faculty advisor to the vice chancellor for research and engagement. In addition, Kurose has been a Visiting Scientist at IBM Research, INRIA, Institut EURECOM, the University of Paris, the Laboratory for Information, Network and Communication Sciences, and Technicolor Research Labs.

His research interests include network protocols and architecture, network measurement, sensor networks, multimedia communication, and modeling and performance evaluation. He was one of the founders of the Commonwealth Information Technology Initiative (CITI) and helped lead the founding of the Massachusetts Green High Performance Computing Center. Dr. Kurose has served on many national and international advisory boards and panels, including the Board of Directors of the Computing Research Association, and the scientific advisory boards of IMDEA Networks in Madrid and the Laboratory for Information, Network and Communication Sciences in Paris. With Keith Ross, he is the co-author of the textbook, Computer Networking, a top down approach (6th edition) published by Addison-Wesley/Pearson.

Kurose has received numerous awards for his research and teaching. He is the recipient of several conference best paper awards, the IEEE Infocom Achievement Award, and the ACM Sigcomm Test of Time Award. He is the recipient of the Outstanding Teacher Award from the National Technological University (8 times), the Outstanding Teaching Award of the Northeast Association of Graduate Schools, and the IEEE CS Taylor Booth Education Medal. He has twice received an IBM Faculty Development Award and a Lilly Teaching Fellowship. Kurose received his PhD in computer science from Columbia University and a BA degree in physics from Wesleyan University. He is a Fellow of the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronic Engineers (IEEE).

Jim Lewis, Deputy Assistant Director, Education and Human Resources Directorate, NSF

W. James “Jim” Lewis is Aaron Douglas professor of mathematics and Director of the Center for Science, Mathematics, and Computer Education at the University of Nebraska-Lincoln. A Fellow of the American Mathematical Society, Dr. Lewis was chair of the writing team that produced the CBMS report, The Mathematical Education of Teachers II, co-chair of the National Research Council’s committee that produced Educating Teachers of Science, Mathematics, and Technology: New Practices for the New Millennium, and a member of the NRC committee that produced Preparing Teachers: Building Evidence for Sound Policy. He was a member of the American Mathematical Society’s Task Force that produced Towards Excellence: Leading a Doctoral Mathematics Department in the 21st Century and author of the book’s first four chapters. For the past 15 years, Lewis has worked to improve the mathematical education of teachers in Nebraska with the support of three major grants from the NSF, Math in the Middle Institute Partnership, NebraskaMATH and Nebraska-NOYCE. Currently he is on leave from Nebraska at the National Science Foundation where he is serving as the Deputy Assistant Director for the Directorate for Education and Human Resources.

Shirley M. Malcom, Director for Education and Human Resources (EHR) Programs, AAAS

Shirley M. Malcom, Director for Education and Human Resources (EHR) Programs at AAAS, has served as a program officer in the NSF Science Education Directorate; an assistant professor of biology, University of North Carolina, Wilmington; and a high school science teacher.

Malcom received her PhD in Ecology from the Pennsylvania State University; Master’s in Zoology from the University of California, Los Angeles; and Bachelor’s with distinction in Zoology from the University of Washington. In addition, she holds 16 honorary degrees.

Malcom serves on several boards, including the Heinz Endowments, Public Agenda, Digital Promise, and the National Mathematics and Science Initiative. She serves as a trustee of Caltech and as a Regent of Morgan State University. In 2003, Malcom received the Public Welfare Medal of the National Academy of Science, the highest award granted by the Academy. She was a member of the National Science Board, the policymaking body of NSF, from 1994 to 1998, and of the
Biographies

President’s Committee of Advisors on Science and Technology from 1994 to 2001.

Jennifer Slimowitz Pearl, Deputy Division Director (Acting), Mathematical and Physical Sciences, NSF

Jennifer Slimowitz Pearl is the Acting Deputy Division Director in the Division of Mathematical Sciences at NSF. She recently completed a detail assignment to the Office of the Assistant Director in the Directorate of Mathematical and Physical Sciences, examining partnerships between NSF and non-profit funders of basic research in MPS disciplines. She was formerly a Program Director in NSF’s Office of International Science and Engineering. Pearl has held positions at the National Academies and at Rice University. She was an AAAS/NSF Science and Technology Policy Fellow and was awarded a NSF/NATO Postdoctoral Fellowship to conduct research at the Université du Québec à Montréal. Pearl earned her PhD in mathematics specializing in symplectic geometry from the State University of New York at Stony Brook and her BS in mathematics from Duke University.

Jane Silverthorne, Deputy Assistant Director, Biological Sciences Directorate, NSF

Jane Silverthorne received her BS degree in Biology (First Class Honours) from the University of Sussex, Brighton, England and a PhD in Biochemistry from the University of Warwick. Her research training is in the area of plant biology and her research has focused on the role of the phytochrome system in regulating plant growth and development. Silverthorne came to the National Science Foundation in 1999 as a Program Director from the University of California, Santa Cruz, where she served as Professor of Molecular, Cellular and Developmental Biology. She subsequently accepted a permanent Program Director position in 2003 and served as a Cluster leader responsible for the management of the Plant Genome Program in the Division of Biological Infrastructure (DBI). Between November 2006 and March 2008, Silverthorne was on detail at the White House Office of Science and Technology Policy as a Senior Policy Analyst in the Life Sciences. In November 2007, Silverthorne was appointed Acting Deputy Director for DBI, and she became Deputy Director in December 2008. In June 2009, she moved to the Division of Integrative Organismal Systems where she served as Deputy Division Director and Division Director. In April 2014, Silverthorne was appointed Deputy Assistant Director for the Biological Sciences Directorate. In this role, she serves as Vice President of the Board of Trustees for the Human Frontier Science Program (HFSP) and as Head of the US delegation to the Global Biodiversity Information Facility (GBIF).

Susan Singer, Division Director, Division of Undergraduate Education, NSF

Susan Rundell Singer is Division Director in the Division of Undergraduate Education at NSF and Laurence McKinley Gould Professor, in the Biology and Cognitive Science Departments at Carleton. She pursues a career that integrates science and education. In addition to a PhD in biology from Rensselaer, she completed a teacher certification program in New York State. A developmental biologist who studies flowering in legumes and also does research on learning in genomics. Singer is a AAAS fellow and received both the American Society of Plant Biology teaching award and Botanical Society of America Charles Bessey teaching award. She directed Carleton’s Perlman Center for Learning and Teaching, was an NSF program officer in Biology, and is a co-author of the Vision and Change in Undergraduate Biology report and an introductory biology text. She has served on numerous boards, including the NSF EHR advisory committee, Biological Sciences Curriculum Study Board, the American Society of Plant Biology Education Foundation, and the Botanical Society board of directors; is a member-at-large for the AAAS Education Section; participates in the Minnesota Next Generation Science Standards team; and was a member of the National Academies Board on Science Education. She has participated in six National Academies studies, including chairing the committees that authored America’s Lab Report, Promising Practices in STEM Undergraduate Education and Discipline-based Education Research: Understanding and Improving Learning in Undergraduate Science and Engineering.

Linda Slakey, Education Consultant and former Director of the Division of Undergraduate Education, NSF

Linda Slakey served at the University of Massachusetts Amherst from 1973–2006, first as a member of the faculty in the Department of Biochemistry, then Dean of the College of Natural Sciences and Mathematics, and then Dean of Commonwealth Honors College. She supported teaching and learning initiatives throughout the University, with particular attention to faculty development, the support of research on how students learn, and engaging undergraduate students in research. From 2006 through 2011, she
Lee Zia, Deputy Division Director, Division of Undergraduate Education, NSF

Lee Zia is the Deputy Division Director for DUE. He served as the Lead Program Director for the NSF National Science, Mathematics, Engineering, and Technology Education Digital Library (NSDL) Program from its inception in FY 2000 to its sunsetting in FY 2010. He served as a "rotator" in the NSF Division of Undergraduate Education during calendar years 1995 and 1996, while on leave from the Department of Mathematics at the University of New Hampshire. Zia rejoined the NSF as a permanent staff member in the fall of 1999. From November 2008 to December 2009, he served as a Commerce Science and Technology Fellow in the Office of Senator John D. Rockefeller IV. Most recently he served as the Lead Program Director for the STEM Talent Expansion Program (STEP). Zia holds degrees in mathematics from the University of North Carolina (BS) and the University of Michigan (MS), and applied mathematics from Brown University (PhD).