Office of Diversity and Equal Opportunity

The MissionSTEM Web site is designed to assist NASA grant recipients with their civil rights compliance efforts. The Agency strives to provide a broad scope to its technical assistance in this arena. + Read More

Compliance Requirements
For NASA Grantees

Promising Practices
For Colleges and Universities

Promising Practices
For Science Centers and Museums
STEM for All

Jo Handelsman
Associate Director For Science
White House Office of Science and Technology Policy

NASA MissionSTEM Summit
August 8, 2016
STEM for All

- Overview of Goals
- Active Learning
- Course Access
- Bias and Image
Priorities in the FC-STEM 5-year Strategic Plan

- Evidence-based practice
- Community colleges
- Research experiences
- Mathematics success
Presidential Goals

- Produce 1 million more STEM college graduates who reflect the demographics of the college population by 2022

- Train 100,000 more excellent STEM teachers for K12
A Challenge and Opportunity

>60% of the students who start college intending to major in STEM graduate with degrees in STEM
Retention of Members of Some Ethnic Minorities in STEM Majors is Below 20%

Source: University of California Los Angeles, Higher Education Research Institute
STEM for All

Goal:
Increase STEM college graduates by increasing retention of all students in STEM majors.
STEM for All

- Overview of Goals
- Active Learning
- Course Access
- Bias and Image
Active Learning
active engagement of students in the learning process

Fast = Rapid

Fast = R___p___d
Diverse active learning methods enhance learning

- Case studies
- Writing w/peer review
- Problem-based learning
- Testing
- Problem sets in groups
- Clickers
- Concept mapping
- Group tests
- Small group discussion & peer instruction
- Analytical challenge before lecture
- Computer simulations and games
College Research or Design Courses in 1st or 2nd Year

- Increase retention in STEM majors
- Reduce frequency of poor grades (D or F)
- Reduce rate of withdrawal from college
- Improve higher order thinking skills
- Generate student identity as scientist
- Make students part of a science community
Active Learning Day

- NSF-White House Collaboration
- Back to school effort
- Follow with action in colleges and universities
STEM for All

- Overview of Goals
- Active Learning
- Course Access
- Bias and Image
Expand Access to Advanced STEM Courses

- Complete training 100,000 new STEM teachers by end of Administration.
- Support NSF’s efforts to recruit & train CS teachers in evidence-based curriculum.
- Replicate Joining Forces pilot to expand math and science AP courses.
- Recognize bipartisan bill that made computer science a STEM subject.
- Public-private partnerships >$1 billion.
STEM for All

- Overview of Goals
- Active Learning
- Course Access
- Bias and Image
Evidence of Bias in STEM

- Employment data
- RCT studies
- Effects of bias reduction
- Imagines in mass media
Salaries of Men with Bachelor’s Degrees are 18% Higher than Women’s **ALL AGES**

**MEDIAN ANNUAL SALARY OF US SCIENTISTS AND ENGINEERS EMPLOYED FULL TIME IN 2008**

- Female: $65,000
- Male: $80,000

**DATA SOURCE:** NATIONAL SCIENCE FOUNDATION TABLE 9-16

[HTTP://WWW.NSF.GOV/STATISTICS/WMPD/2013/TABLES.CFM]
Salaries of Men with Bachelor’s Degrees are 26% Higher than Women’s 29 and Younger
Reviewers rate candidate’s verbal skills based on text.

Rated skills lower if they were told an African American wrote the text than if a white person wrote it. A man wrote it than when told a woman wrote it.

Biernat et al., 1991; Biernat and Manis, 1995
Randomized and Controlled Hiring Studies

- Identical applications assigned male or female name – each evaluator sees only one version with either the male or female name on it.

- Substantially more likely to hire a given applicant if there is a man’s name on application.

- Same result over 40 years even though explicit or conscious bias has diminished.
Research on Bias

- CVs of a real professor were assigned a male or female name, randomly, and sent to 238 academic psychologists
- CV at time of job application
- CV at time of early tenure decision
- Respondents more likely to hire if male name on job application
- Gender of applicant had no effect on respondents’ likelihood of granting tenure

Steinpreis et al., 1999
However......

CV’s were returned to researchers
There were “cautionary comments” in margins of tenure package four times more often on those with woman’s name:

“We would have to see her job talk.”
“It is impossible to make such a judgment without teaching evaluations.”
“I would need to see evidence that she had gotten those grants and publications on her own.”

Steinpreis et al., 1999
Research on Bias

- In every study, there is a significant effect of the gender or race of person being evaluated.
- NO significant effect of gender or race of person doing the evaluation.
Study of Bias in Scientists

- 127 biologists, chemists, and physicists
- Six top research universities
- Sent participants a student description
- Randomly assigned name “Jennifer” or “John”
- Questions about student
  - Hire as lab manager?
  - Competence?
  - Provide mentoring?
  - Salary?
Results: Would Jennifer or John Be Hired?

\( t(125) = 4.22, \ p = .001, \ \eta^2 = .70 \)
Would Jennifer or John receive mentoring?

\[ t(125) = 3.43, \ p < .01, \ d = .60 \]
How much would Jennifer or John be paid?

<table>
<thead>
<tr>
<th>Salary</th>
<th>25,000</th>
<th>26,000</th>
<th>27,000</th>
<th>28,000</th>
<th>29,000</th>
<th>30,000</th>
<th>31,000</th>
</tr>
</thead>
</table>

Female

Male

\[ t(125) = 2.94, p < .01, d = .51 \]
Did the faculty gender matter in their evaluation of Jennifer or John?

![Bar graph showing comparison between men and women participants for Male and Female targets.](image)

- **Condition**: $f(1,126) = 13.43, p < .001$
- **Gender**: $f(1,126) = .12, ns$
- **Condition X Gender**: $f(1,126) = .03, ns$
Other recent studies show...

- Faculty less likely to respond to emails about research opportunities from women and ethnic minorities (6500 faculty members) - Mailman et al., 2014

- “Elite” faculty in biomedical sciences—male PI’s have fewer women in their labs than female PI’s - Sheltzer and Smith 2014
Faculty as Gatekeepers

- Faculty provide students
  Formal and informal advising
  Access to opportunities
  Feedback on their abilities
  A vision of a professional path
Other Manifestations of Bias

Structural –

- barriers to work-life balance that affect women more than men
- practices that favor male performance such as lecturing vs active learning
- Images in institutions of higher learning
Addressing bias
https://www.whitehouse.gov/blog/2015/07/16/stem-strength-through-diversity

- Report on “Mitigating the Effects of Implicit Bias”
- Assisting mass media writers with depictions of science and scientists
Image of STEM in the Media
Katherine Johnson
From forgotten figure to celebrity
Teraji P. Hensen as Katherine Johnson in forthcoming "Hidden Figures"
Image of STEM in the Media

- Work with entertainment industry
- Collaborate with writers, producers, and actors
- Promote positive and diverse representations of STEM people and professions in popular media
- Engage advertising media community to raise awareness, and seek commitments
Mass Media and STEM

- NFE, ANA pledge about depiction of women and women in STEM in TV ads and women
- Noted changes — Blackish character—“Chemistry nerd”
- Dashboard to rate commercial and show content
Entertainment Media and Social Change

- Image of smoking (US)
- Concept of designated driver (US)
- Teen pregnancy (US)
- Inter-racial families (Rwanda)
- Gay/lesbian acceptance (US)
Vision of Future Workforce

- Resembles demographic profile of the US
- Abundant workers with STEM training to fill jobs in STEM and in other fields
- Populated with critical thinkers about STEM
- Populated with non-STEM workers who understand the nature of science
http://www.ostp.gov

@jo44
MissionSTEM
21st Century Civil Rights Technical Assistance for Science, Technology, Engineering, and Mathematics

Office of Diversity and Equal Opportunity

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Send your questions for this session to: civilrightsinfo@nasa.gov
NSF Big Ideas for Future

- Navigating the New Arctic
- Harnessing Data for 21st Century Science and Engineering
- Shaping the New Human – Technology Frontier
- Understanding the Rules of Life: Predicting Phenotype
- Windows on the Universe: The Era of Multi-messenger Astrophysics

Growing Convergent Research at NSF

NSF INCLUDES

Mid-scale Research Infrastructure

NSF 2050

DR. FRANCE A. CÓRDOVA
DIRECTOR, NATIONAL SCIENCE FOUNDATION
AUGUST 8, 2016
The New Human Technology-Frontier
Office of Diversity and Equal Opportunity

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+ Read More

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Promising Practices
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Promising Practices
For Science Centers and Museums
Scientists and engineers working in science and engineering occupations: 2013

- White men 51%
- Asian men 12%
- Asian women 5%
- Black men 3%
- Black women 2%
- Hispanic men 4%
- Hispanic women 2%
- Other men 1%
- Other women 1%

NOTE: Hispanic may be any race. Other includes American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and multiple race.

Science and engineering degrees earned by underrepresented minority women and men: 1993-2012

- Bachelor's, women
- Masters, women
- Bachelor's, men
- Masters, men
- Doctorate, women
- Doctorate, men

Reasons for not working among scientists and engineers: 2013

- Family
- Job not available
- Layoff
- Retired

NOTE: Not all reasons are shown; respondents could select more than one reason.
Women as a percentage of full-time, full professorship
in science, engineering, and health: 1993-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>All institutions</th>
<th>Research I institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>1999</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>2006</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>2013</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>2013</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>2013</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

NOTE: Criteria for research I institutions based on 1994 Carnegie classification.
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What Inspired Me?

The New York Times

MEN WALK ON MOON
ASTRONAUTS LAND ON PLAIN; COLLECT ROCKS, PLANT FLAG

Vote From Moon: "Eagle Has Landed"

A Powdery Surface Is Gently Explored

The Jetsons
MissionSTEM
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University of Texas at El Paso

Department of Mechanical Engineering

Where Opportunity Meets Excellence

Panel: Accessing NASA Grants/Contracts
MissionSTEM Summit 2016
National Aeronautics and Space Administration
NASA Headquarters August 8-9, 2016

Ahsan Choudhuri, PhD
Professor and Chair, Department of Mechanical Engineering
Mr. and Mrs. MacIntosh Murchison Chair II in Engineering
Director, NASA MIRO Center for Space Exploration and Technology Research
University of Texas at El Paso, USA

The First National Research University Serving a 21st Century Student Demographic
me.utep.edu
Almost 100 years ago, 27 students rode streetcars and walked nearly a mile through the dusty desert to the Texas State School of Mines and Metallurgy. It was Sept. 23, 1914, the first day of school at what would become The University of Texas at El Paso.

- Enrollment: 24,000+
- Faculty: 1,200+
- Academics: 7 Colleges: Business Administrations, Education, Engineering, Health Sciences, Liberal Arts, Nursing, and Science
- Annual Operating Budget: $404.6 million
- Annual Research Expenditures: $90 million

The University of Texas at El Paso's extraordinary progress in developing its research capacity and expanding its doctoral programs has earned UTEP the designation as one of the state's "Emerging Tier One" universities by the Texas Higher Education Coordinating Board.
We Believe in Tier I Higher Education for Common People

- We reject the traditional choice between Access and Excellence that characterized U.S. higher education in the twentieth century and insist upon the joint attainment and continuing enhancement of both Access and Excellence.

- We are poised to bring our region the pinnacle of excellence in public higher education – that is, the full capacity, breadth, innovation and regional impact of a national research university.
Integrated Capacity Building

Mechanical Engineering Department

Collaborations across the Department's Boundary

NASA MIRO Center for Space Exploration and Technology Research

Research Management (Advanced Manufacturing)
- Research Strategies and Development
- Research Infrastructure Development and Management
- Contracts and Grants
- Charge Center/Cost Center
- Professional Staff and Research Faculty
- Professional Graduate Programs

Research Management (Aerospace and Energy)
- Research Strategies and Development
- Research Infrastructure Development and Management
- Contracts and Grants
- Professional Staff and Research Faculty
- Professional Graduate Programs

Academic Management
- Students and Faculty
- Curriculum
- Course Scheduling
- Advising and Progress Tracking and Monitoring
- Teaching Innovation and Excellence
- Tenure and Promotion
The cSETR vision is to establish a minority university Center of Excellence in Advanced Propulsion research through strategic partnerships and to educate a diverse future aerospace workforce.

- Aerospace and Defense Systems
- Energy Engineering
- Crosscutting Technologies
Our Story: Building an Aerospace Education and Research Program from Scratch
Partnerships
Accomplishments (2009–2014)

- 267 students supported within the Center since 2009
- 60 student interns and co-ops in aerospace industry since 2009
- 10 NASA new hires and many aerospace and defense contractor hires
- 78% of all NASA sponsored students from underrepresented groups in STEM, 65% from all funding sources
- 35% of sponsored students are undergraduates, 65% graduate students (PhD and MS)
- Average of 80 students, 8 faculty per semester sponsored in research in the Center
- 166 different professional & technical publications (journal articles, conference proceedings, etc)
- 40+ articles in AIAA Conferences
- $14M in total support since 2009
- Significant infrastructure and capacity building: $ 5M Institutional Investment
  - 14,000 sq-feet of advanced aerospace and energy research laboratories
  - 3,000 sq-ft instructional laboratory capacity building
  - Multiple vacuum chambers, altitude simulation system, LOX-Methane injectors and igniters, multiple low thrust measurement stands, multiple liquid methane production units, numerous advanced diagnostic and imaging systems
- > 5,500 students in K-12 with 20 or more hours of direct contact
- > 18,000 K-12 in outreach effort (8 hours or less)
- > 170 professional development and outreach events
- Strategic Partnership with NASA JSC, NASA GRC, and NASA MSFC
- Strategic Partnership with Lockheed Martin Corporation
A sustainable Pathway to Access and Excellence

**Compete, Collaborate, and Cooperate**
- Funding Portfolio Diversification: Mainstream and Set-aside funding from federal agencies, Industry Task Orders, and Cost Centers
- Partnerships with Research 1 Universities
- Partnerships with other HBCU and MI and Regional Institutions
- Articulation Agreement with Community College

**Capacity Building**
- Physical Infrastructures
- Research Instrumentation
- Faculty Recruitment and Mentoring
- Academic Programs Development
- Experiential Learning, Preprofessional Experience and Industry Best Practice based Student Training

**Preeminence**
- The First National Research I University Serving 21st Century Student Demographics

A Propulsion Education and Research Program that defies the traditional choice between Access and Excellence and cherishes a core mission of creating opportunities for students who are first in their family to attend college and come from a family with a yearly income of less than $18,000 dollars. The Program provides a clear shot at NASA and aerospace industry careers.

2009-2019
Technical Goal (LO$_2$/CH$_4$ Propulsion Technologies)

- LO$_2$/Methane Propulsion Risk Reduction
- Integration of Propulsion, Power and Thermal Systems at the Spacecraft Level
- Additive Manufacturing (AM) Capability Demonstrations and Maturation

**DAEDALUS**
Suborbital Payload Scale Methane Propulsion Technology Testbed

**CROME**
500 lb LO$_2$/CH$_4$ Engine

**PENCIL THRUSTER**
5 lb Reaction Control System

**JANUS**
Robotic Lander Scale Methane Propulsion Technology Testbed

**PENCIL-X THRUSTER**
5-10 lb Reaction Control System

Note: Cold GHe Not Shown (see next page)
Technical Goal
[Green Propulsion Technologies/Missile Defense Agency DACS]

- HTP
- LMP-103S
- AF-M315 E

- Monolithic Catbed
- Additive Manufacturing

CubeSat Modular Green Propulsion Testbed
5 lbf, 1 lbf, and 0.1 lbf
Research Capacity Development at HBCU and MIs
- Faculty and Staff Development
- Major Research Equipment and Acquisition Programs
- Research Equipment Loan and Donation Programs
- Contract Management Personnel Development
- HBCU and MI Set-aside funding for Aerospace Research Programs
- University-Industry-NASA Center Collaborative Research Programs
- Regional Capacity Development

- Universities, Industries and Multi-agency Partnerships
Regional Impact
MIRO cSETR-El Paso Community Partnership

- Technology Research and Innovation Acceleration (tRIAc) Park [2015-2020]: 30 miles from the main campus
  - Fabens Airport, 400 acres El Paso County Land, and 9,600 acres University of Texas Systems Land
  - UTEP cSETR and El Paso County Economic Development Partnership
Block A Development Strategies
Small Hi-Tech Business Ecosystems

- Contracts
  - SBIR/STTR Programs
  - Subcontracting
  - HBCU/MI Set-aside

- Economic Development Assistance Grants
- Internally and Externally Funded Capital Projects

- EP County
- UTEP cSETR
- UTEP KECK

- NASA Centers
- Prime Contractors

Small Business
Small Business
Small Business
Small Business
STRATEGIC CAMPAIGN TO ADDRESS
LOCKHEED MARTIN’S
WORKFORCE CHALLENGE

Courtesy: David Rapisand
Lockheed Martin Aeronautics
Operation BoldStroke
Lockheed Martin Aeronautics and UTEP Partnership
## Operation BoldStroke

**Lockheed Martin Aeronautics and UTEP Partnership**

<table>
<thead>
<tr>
<th>Tech Ops</th>
<th>Prod Ops</th>
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<tr>
<td>Advisory Board</td>
<td>Research Projects</td>
</tr>
<tr>
<td>Curriculum Development</td>
<td>Recruiting / Internships</td>
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# Operation BoldStroke

Lockheed Martin Aeronautics and UTEP Partnership

## Curriculum Development

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<th>Development Of Master Of Science Program</th>
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<tbody>
<tr>
<td>&quot;Systems Engineering&quot;</td>
<td>&quot;Software Engineering&quot;</td>
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## Advisory Boards

<table>
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<th>College of Engineering</th>
<th>College of Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dean's Advisory Board</td>
<td>• Dean's Advisory Board</td>
</tr>
<tr>
<td>• Systems Engineering</td>
<td>• Accounting Advisory Board</td>
</tr>
<tr>
<td>• Software Engineering</td>
<td>• ERP Advisory Board</td>
</tr>
<tr>
<td>• Industrial Engineering</td>
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</tbody>
</table>

UTEP Considering Offering Engineering Aeronautics Curriculum

New Opportunity For LM To Influence Curriculum Development
**Operation BoldStroke**  
Lockheed Martin Aeronautics and UTEP Partnership

- **40+ projects over 8 years totaling nearly $4M**  
  - (Does not include Palmdale ADP)

<table>
<thead>
<tr>
<th>Year</th>
<th>Task Value</th>
<th># Of Tasks</th>
<th>Organizations</th>
<th>Projects</th>
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</thead>
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<td>Tech Ops</td>
<td>Prod Ops</td>
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<tr>
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<tr>
<td>2015</td>
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Operation BoldStroke
Lockheed Martin Aeronautics and UTEP Partnership
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Lockheed Martin Aeronautics and UTEP Partnership

<table>
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<tr>
<th>Objective</th>
<th>Descriptive</th>
<th>Achieved</th>
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<tbody>
<tr>
<td>LM Leadership</td>
<td>Build Relationships With Administration, Professors &amp; Students</td>
<td>✔️</td>
</tr>
<tr>
<td></td>
<td>Provide Proactive Development Of Engineering Curriculum</td>
<td></td>
</tr>
<tr>
<td>Collaboration</td>
<td>Influence Research And Education Direction / Orientation Of Faculty &amp; Students</td>
<td>✔️</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Opportunity To Sponsor Directed Research Programs</td>
<td>✔️</td>
</tr>
<tr>
<td>Recruiting</td>
<td>Preferential Access to Top Diversity Graduates (Engineering &amp; Business)</td>
<td>✔️</td>
</tr>
<tr>
<td>Campus Activity</td>
<td>Recruiting, R&amp;D, Executive Visits, E-Week, Teaching &amp; UTEP Student Visits At Aero</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Operation BoldStroke
Lockheed Martin Aeronautics and UTEP Partnership
Thank You

NASA MIRO Center for Space Exploration & Technology
Research
Mechanical Engineering Department
University of Texas at El Paso
Engineering Building Bldg. Room M 305
500 W. University Ave.
El Paso, TX 79968-0521

Tel: (915) 747-8252; Fax: (915) 747-5549
csetr@utep.edu
research.utep.edu/csetr
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NASA MissionSTEM Summit: FAMU Experience

Okenwa Okoli
US DoE – Samuel P. Massie Chair of Excellence
Industrial & Manufacturing Engineering
Florida Agricultural & Mechanical University
• Six years working with a Large Prime – Orbital ATK
• 3 teams, each made of 3 students (9 students) were mentored by Orbital ATK engineers and managers each year
• Students put six-sigma into practice
  • Define, Measure, then mid review
  • Analyze, Improve, Control, then final review
• Training
  • Performance Enterprise System (PES)
  • 5-S
    • Sort, Set in order, Shine, Standardize, Sustain
• Students were mentored throughout the academic year via conference calls and face-to-face where possible
• Review sessions were attended by ATK mentors with feedback provided
• Resume building workshop by Orbital ATK
Outcomes – Manpower Development

- The students who had their resumes boosted by their Orbital ATK experience easily found employment in STEM fields.

- A good number were motivated to attend our graduate program at FAMU (funded), and elsewhere.
  - One of these minority students defended his doctoral research in April, and is well employed at Intel; another is on track to graduate next year.
  - This relationship with Orbital ATK also allowed us to fund a number of minority undergraduate research assistants to keep them interested in graduated study.
Resulting Relationships

• Orbital ATK currently on our IME Industry Advisory Board
• Working with Aileen Yates Aerojet Rocketdyne
• Working with Michelle Butzke and LM team on a proposal for IDIQ Task Order Support
• Hosting a NASA HBCU/MSI Technology Infusion Road Tour at Florida A&M University (FAMU) on September 27-29, 2016
$10M State-of-the-Art Equipment and Unique Scale-up Manufacturing Capability

Leading, Leaning, Building a Legacy… Manufacturing Upwards!
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NASA MissionSTEM Summit

Orbital ATK contract/MPA with Florida A&M University

August 8, 2016
Contract Opportunity

- Space Launch System – Marshall Space Flight Center

- Accomplishment = Team Approach.

  ➢ **NASA MSFC**
  - Goal Requirement
  - Mentor Protégé Program and Contractual Changes

  ➢ **Orbital ATK**
  - Leadership Assurance
  - Technical Champion

  ➢ **Florida A & M University**
  - Understanding and Opportunity
  - Working outside the box
Building Relationships – Contractors View

- Orbital ATK worked internally with Contracts and Program Management to identify a possible solution in meeting the goal requirements.

- SBLO takes the lead in identifying HBCU/MI Strengths and Capabilities.

- Identify a course of action that yields a return on investment. Make a good faith effort toward your goal that adds value to your contract.

- Management assigns a champion from his staff.

- Selection of the University.
Important Details and Understanding Process

- Meetings with FAMU to discuss possible ways to contract. Decision on what to break out from the Orbital ATK contract for consideration.
  - Study to optimize fabrication process flow for refurbishment, assembly and verification testing of the SLS Core Stage Attach Rings and implementation analysis.

- Technical Team wrote the statement of work and reviewed with the FAMU staff to ensure they were capable of the work. Two months to negotiate T&C’s.

- Contract specifics – Study needed to be completed by the end of the school year. Multiple year contract with seniorclass project.

- Availability of OrbitalATK engineering and project lead was critical in completing the study as outlined in the statement of work. Continuous Q&A
Coordinate Expectation of Contract

- Contract is a legal binding agreement between two parties. A Mentor Protégé Agreement is an agreement for actions from both the Mentor and the Protégé.

- MPA - Orbital ATK provided training and tools to assist with the success of the study.
  - Propulsion Enterprise System Training – Improvement, Cost Save, Competitive.
  - Hardware Processing Services – Program Process Constraints.
  - Value Stream Mapping – Current Condition and Target Condition
  - Marketing Individual Development – Resume Development

- Benefits to the Mentor or Prime Contractor.
  - Benefit from the intel and knowledge of a University and associated staff.

- Protégé Benefits.
  - Real life experience working on the space program.
Benefits to the Space Program

- Industry and Educational communities working together to go forward.
  
  - Industries' technology today is not going to be applicable as time goes on, we are in a never-ending race to improve and move forward.
  
  - Universities create an environment of expanding all possibilities to think beyond past experience or situation.
  
  - Working together as a team for each the same objective would be an ideal situation. Respecting both parties' processes to be able to complete a contract is the goal.
  
  - Future and continual accomplishments for the space industry will start from the real experiences offered to the next generation.
Office of Diversity and Equal Opportunity

The MissionSTEM Web site is designed to assist NASA grant recipients with their civil rights compliance efforts. The Agency strives to provide a broad scope to its technical assistance in this arena.

Send your questions for this session to: civilrightsinfo@nasa.gov
Accessing NASA Grants/Contracts
“The MUREP Perspective”
MissionSTEM Summit
August 8, 2016

Tania B. Davis, Acting MUREP Manager, NASA Headquarters
• Guiding Framework
• Define MUREP and its role in NASA Education
• MUREP Activities (EONS 2014 solicitation)
• Q&A
NATIONAL PRIORITIES

- America COMPETES Reauthorization Act of 2010


- National Science and Technology Council (NTCS) Committee on Science, Technology, Engineering and Mathematics Education (CoSTEM)
  https://www.whitehouse.gov/administration/eop/ostp/nstc/committees/costem

  https://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf
AGENCY PRIORITIES


  **Goal 2**: Advance understanding of earth and develop technologies to improve the quality of life on our home planet.

  **Objective 2.4**: Advance the Nation’s STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers and faculty in NASA’s missions and unique assets.


- **Multi-year Performance Goals and Annual Performance Indicators**
Agency’s Response to Presidential Executive Orders for Minority Serving Institutions

MUREP is established to **increase NASA’s responsiveness to federal mandates** related to Minority Serving Institutions (MSIs) and underrepresented and underserved communities, including women, girls, persons with disabilities and veterans.

- **EO 13532:** Historically Black Colleges and Universities (HBCUs)
- **EO 13592:** Tribal Colleges and Universities (TCUs)
- **EO 13555:** Hispanic Serving Institutions (HSIs)
- **EO 13515:** Asian American and Native American Pacific Islander – Serving Institutions (AANAPISIs)
- **EO 13621:** Predominantly Black Institutions (PBIs)
Administered by NASA’s Office of Education and Implemented at NASA’s 9 Field Centers and at JPL

- Ames Research Center, CA
- Armstrong Flight Research Center, CA
- Glenn Research Center, OH
- Goddard Space Flight Center, MD
- Jet Propulsion Laboratory (Cal Tech), CA
- Johnson Space Center, TX
- Kennedy Space Center, FL
- Langley Research Center, VA
- Marshall Space Flight Center, AL
- Stennis Space Center, MS
| FOUR LINES OF BUSINESS | LEARNERS | NASA Internships, Fellowships, and Scholarships (NIFS) utilizes NASA’s facilities and assets to provide work experiences and research and educational opportunities to improve retention in STEM and prepare students for employment in STEM jobs. |
| | EDUCATORS | Educator Professional Development (EPD) prepares STEM educators and leaders to deliver quality STEM instruction utilizing unique NASA assets and content. |
| | INSTITUTIONS | Institutional Engagement (IE) focuses on improving the capacity of U.S. institutions to deliver effective STEM education. |
MUREP Activities
(EONS 2014)
MUREP Educator Institute (MEI)
Stennis Space Center

✧ Support or financial assistance to eligible MSIs

*Proposals are not being solicited at this time.*
Purpose & Goals

Established to bring pre-service and alternative route STEM educators from MSIs across the country to NASA centers annually for a one week professional development session. Awarded MSIs facilitate in-depth learning institute(s) for participants at each NASA field Center.

- **ENGAGE WITH MSIs** to bring high performing undergraduate students, who plan to teach STEM, to NASA Centers for one week to interact with NASA missions and SMEs;
- **ENGAGE PARTICIPATING FUTURE EDUCATORS WITH NASA EXPERTS** to collaborate and provide the most advanced and innovative pre-service/alternate route experiences possible;
- **INSPIRE FUTURE EDUCATORS TO HELP NASA COMMUNICATE WITH STUDENTS** for years to come; and
- **REACH UNDERSSERVED AND UNDERREPRESENTED POPULATIONS AND INSTITUTIONS.**

Objectives

- Engage pre-service and alternative route educators enrolled in MSIs in NASA-unique, authentic STEM experiences affiliated with NASA missions and facilitated by NASA SMEs; and
- Train these future educators in the use of evidence-based instructional practices that provide students with rich, NASA-unique STEM learning opportunities.
Eligible applicants are:

Minority Serving Institutions as designated and listed by the U.S. Department of Education.

Awards are funded as three-year cooperative agreements, not to exceed $1,000,000 per year.

FY2015: One award (Approx. $1M)

- Texas State University – San Marcos
- Direct support or financial assistance to eligible MSIs
- Typically funded as competitive cooperative agreements

**Proposals are not being solicited at this time.**
Purpose & Goals

Established to strengthen and develop the research capacity and infrastructure of Minority Serving Institutions (MSIs) in areas of strategic importance and value to NASA’s mission and national priorities.

- **EXPAND THE NATION’S BASE** for aerospace research and development;
- **DEVELOP MECHANISMS FOR INCREASED PARTICIPATION** by faculty and students at MSIs in the programs of NASA’s mission directorates; and
- **INCREASE THE NUMBER OF UNDERGRADUATE AND GRADUATE DEGREES** to students from MSIs in NASA-related fields.

Objectives

- Establish multi-disciplinary STEM research centers at the host university;
- Improve rates that underserved and underrepresented students receive degrees in NASA-related fields; and
- Gain support from sources outside of MIRO by pursuing additional funding opportunities.
Eligible applicants are:
(1) Minority Serving Institutions
(2) Institutions in partnership with (i) at least one four-year Institution of higher education and (ii) one or more NASA Centers.

Awards are funded as five-year cooperative agreements, not to exceed $1,000,000 per year.

FY2015: 10 awards (Approx. $10M/year)

- California State Univ. – Los Angeles
- Delaware State University
- Hampton University
- Langston University
- San Jose State University
- University of California – Merced
- University of California, Riverside
- Xavier University of Louisiana
- University of the Virgin Islands
Established to strengthen curriculum and curricular pathways in STEM, and attract, retain, and support the success of underrepresented students in STEM degree programs.

- **INCREASE THE NUMBER OF STEM COURSES AND CURRICULAR PATHWAYS** that are available at Minority Serving Community Colleges (MSCCs);
- **ATTRACT, RETAIN, AND SUPPORT THE SUCCESS OF STUDENTS** in STEM degree programs, and subsequently in NASA-related careers;
- **INCREASE THE NUMBER OF STUDENTS WHO COMPLETE STEM CERTIFICATES/DEGREES** from backgrounds that are historically underrepresented in STEM.

**Objectives**

- Develop curriculum improvements in STEM vocational certificate programs, AA/AS degree programs, and/or transfer programs;
- Expand the STEM pipeline through the development of new or existing high school partnerships; and
- Develop and expand curricular options in engineering.
Eligible applicants are:

Minority Serving Community Colleges

Awards are funded as three-year cooperative agreements.

FY2015: 4 awards (Approx. $1M/year)

- Baltimore City Community College
- Napa Valley Community College
- Queensborough Community College – CUNY
- Santa Monica Community College
STEM Engagement Activities

MUREP STEM Engagement (MSE)
Kennedy Space Center

MUREP Aerospace Academy (MAA)
Glenn Research Center

MUREP American Indians & Alaskan Native STEM Partnership (MAIANSP)
Goddard Space Flight Center

✧ Direct support or financial assistance to eligible MSIs
✧ Typically funded as **competitive cooperative agreements**

**Proposals are not being solicited at this time.**
Purpose & Goals

Established to create and implement a NASA-related STEM challenge.

- INCREASE THE RETENTION AND COMPLETION RATES OF UNDERGRADUATE DEGREES awarded from MSIs in NASA-related STEM disciplines;
- INCREASE THE NUMBER OF NASA-FOCUSED STEM EXPERIENCES that engage underrepresented groups in active learning to improve retention of information and critical thinking skills; and
- DISSEMINATE PROVEN, INNOVATIVE PRACTICES AND PROGRAMS IN STEM TEACHING, STEM LEARNING, AND RECRUITMENT AND RETENTION of underrepresented/ underserved students in STEM fields.

Objectives

- Design, develop, and implement a NASA-related STEM challenge targeted for MSI and community college STEM-enrolled student participation;
- Align the challenge design with the NASA mission and with a specific NASA program or project; and
- Develop and implement processes to capture the impact of activities and strategies implemented through this challenge.
Eligible applicants are:

Four-Year Colleges/Universities and Two-Year Minority Serving Community Colleges.

Awards are funded as three-year cooperative agreements, not to exceed $600,000 per year.

FY2015: One award to University New Mexico
Next Swarmathon Competition
APRIL 2017
at NASA Kennedy Space Center Visitors Complex

[Links and Contact Information]

NASA Contact: Theresa Martinez
Theresa.c.martinez@nasa.gov  (w) 321-867-0590  (c) 321-289-2741
Established to increase participation and retention of historically underserved and underrepresented K-12 youth in STEM.

- **IMPROVE STEM LITERACY** by engaging students, family members and teachers through the integration of emerging technologies; and
- **EDUCATE STUDENTS UTILIZING A STEM CURRICULUM** that meets national STEM standards aligned to NASA’s mission directorates.

- Increase the number of historically underserved and underrepresented students interested in NASA specific STEM careers;
- Provide skills to parents/caregivers to work with and encourage their children in STEM activities and programs;
- Involve community groups, business, industry, museums and educational and professional organizations through mentoring, field trips, guest speakers and other MAA activities; and
- Engage students in participatory activities such as hands-on learning, research use of advanced technology, peer support groups, and mentoring relationships with professionals working in the STEM fields.
Eligible applicants are:

Minority Serving Institutions as designated and listed by the U.S. Department of Education.

Awards are funded as three year cooperative agreements.

Individual award values range from $100,000 - $160,000 for year one and year two. Year three sites receive between $80,000-$100,000 to ensure sustainable operations.

FY2015: 9 awards (Approx. $1.3M/year)

- Tennessee State University
- Texas State University – San Marcos
- Hartnell Community College
- California State University - Fresno
- University of Texas – El Paso
- York College (CUNY)
- Cuyahoga Community College
- Elizabeth City State University
- Morgan State University
Purpose & Goals

Established to improve the quality of STEM education, specifically in computer sciences at American Indian and Alaskan Native MSIs and high schools.

- **INCREASE THE LEVEL OF STEM LITERACY AND ENGAGEMENT** of the American Indian and Alaska Native secondary and postsecondary levels through the utilization of culturally relevant and responsive subject matter;
- **CREATE A DIVERSE, HIGHLY SKILLED, and MOTIVATED FUTURE WORKFORCE** in computer-related sciences;
- **ADVANCE THE UNDERSTANDING OF HOW TO EFFECTIVELY TEACH COMPUTER PROGRAMMING CONCEPTS** to historically underrepresented and underserved populations.

Objectives

- Increase the number of historically underrepresented and underserved students who engage/graduate in computer science studies;
- Improve the rates at which students, who historically have been underrepresented in NASA-related fields, are awarded undergraduate and graduate degrees at their respective universities in NASA-related fields;
- Increase the diversity of the NASA STEM workforce; and strengthen two-year and four-year MSIs in their curricula in order to attract more students into STEM-based academic programs, retain them, and prepare them for success when they take the next steps in their education or in their careers.
Eligible applicants are:

American Indian and Alaskan Native Serving Institutions (AIANSIs)

*Awards are funded as three-year cooperative agreements.*

FY2015: 3 awards (Approx. $800K/year)

- Haskell Nations University
- Southwestern Indian Polytechnic Institute
- Chief Dull Knife College
MUREP Other Opportunities (MOO)
Johnson Space Center

✧ Support or financial assistance to eligible MSIs
**Proposals are not being solicited at this time.**
Established to strengthen curriculum and curricular pathways in STEM, and attract, retain, and support the success of underrepresented students in STEM degree programs.

**Strategic Goal 2:** Advance understanding of earth and develop technologies to improve the quality of life on our home planet.

**Strategic Objective 2.4:** Advance the Nation’s STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA’s missions and unique assets.
Eligible applicants are:

All US Organizations and Minority Serving Institutions (including NASA centers)

Funding:

Awards are funded as three-year cooperative agreements, not to exceed $500,000 per year.

FY2015: 4 awards (Approx. $2M)
FY2016: 2 awards (Approx. $1M)

- University of Hawaii
- University of Texas – El Paso
- Howard University
- Elizabeth City State University
- Lawson State Community College
- City College of New York
Questions
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Office of Diversity and Equal Opportunity

The MissionSTEM Web site is designed to assist NASA grant recipients with their civil rights compliance efforts. The Agency strives to provide a broad scope to its technical assistance in this arena.

Send your questions for this session to: civilrightsinfo@nasa.gov
Diversifying Grants Through Partnerships
Example Programs

NASA Mission STEM
August 8, 2016

Andres Quintanilla
Program Manager
AQuintanilla@EdExcelencia

Consuelo Grier
Director of Constituency Engagement
CGrier@EdExcelencia
Examples of Effective Partnerships

• Louis Stokes Alliance for Minority Participation at UT El Paso
  – Encourages students to participate in a "university exchange" by selecting summer research sites away from their home campuses.

• Pathway to the Baccalaureate at Northern Virginia

• Community College
  – Creates a pipeline between partner institutions and provides seamless transfer

• INfluence Student Potential and Increase Representation in Education (INSPIRE) at Rosalind Franklin University
  – Provides hands-on research opportunities and faculty mentoring to promising high school and college students.
What Works for Latino Students

EdExcelencia.org/Growing-What-Works
MissionSTEM

21st Century Civil Rights Technical Assistance for Science, Technology, Engineering, and Mathematics

Office of Diversity and Equal Opportunity

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NASA Internships, Fellowships, and Scholarships (NIFS)

Carolyn Knowles
Director
Drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.
NASA Education Mission

Advance high-quality STEM education using NASA’s unique capabilities

NASA Strategic Objective 2.4
Advance the Nation’s STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA’s missions and unique assets.
Alignment with National Education Priorities

Enhance STEM Experience of Undergraduate Students: Graduate one million additional students with degrees in STEM fields over the next ten years;

Better Serve Groups Historically Underrepresented in STEM Fields: Increase the number of students from groups that have been underrepresented in STEM fields that graduate with STEM degrees in the next ten years and improve women’s participation in areas of STEM where they are significantly underrepresented; and,

Design Graduate Education for Tomorrow’s STEM Workforce: Provide graduate-trained STEM professionals with basic and applied research expertise, options to acquire specialized skills in areas of national importance, mission-critical workforce needs for the agency, and ancillary skills needed for success in a broad range of careers.
The NIFS Line of Business (LOB) leverages NASA’s unique mission activities to enhance and increase the capabilities, diversity, and size of the Nation’s next generation workforce needed to enable future NASA discoveries.
Internships are competitive awards to support educational work or enhanced research opportunities that provide NASA related experiences for high school, undergraduate, and graduate students, as well as educators.
Internships Criteria

• Minimum contact hours are 400 for college students and 320 for high school students or educators;
• Experience must be mentor-centric;
• Assignments and task-deliverables must be defined/approved by the mentor;
• Experience must be task-centric;
• Assignments and task-deliverables must be degree-relevant and immediately beneficial to the mentor in furthering NASA’s ongoing missions;
• Tasks serve to integrate the intern into a team or group of career professionals.
• Stipend are paid to interns for the benefit of their participation in the educational experience, not for services rendered or hours worked.
NASA Internships occur within 4 sessions per year:

- Fall Session opportunities (16 wks) begin in late August or early September and conclude in Mid-December.
- Spring Session opportunities (16 wks) begin in mid-January and conclude in early May.
- Summer Session opportunities (8-10 wks) begin in late May or early June and conclude in early August.
- Year-Long Session opportunities (greater than 16 wks) do not correspond to the 3 standard sessions above.

Application Period for the 2017 Spring Session:
6/2/2016 - 10/17/2016
Fellowships are competitive awards to support independently conceived or designed research proposals, or senior design projects for graduate students in disciplines needed to help advance NASA’s missions.
Fellowships Criteria

Students should be:

- early in their graduate studies,
- pursuing or planning to pursue graduate studies leading to the Master’s or Doctoral degrees,
- pursuing relevant NASA-related disciplines at accredited U.S. universities.
NASA Aeronautics Scholarship and Advanced STEM Training and Research Fellowship (AS&ASTAR)

- Improve the nation’s future STEM workforce by developing the skills and competencies of graduates pursuing degrees in STEM disciplines;
- Provide opportunities for a diverse population to participate and contribute to NASA’s missions and projects;
- Use NASA’s unique mission content, workforce, and facilities in order to enhance and increase the capabilities, diversity, and size of the nation’s next generation workforce needed to enable future NASA discoveries;
- Improve the rates at which students, who have historically been underrepresented in NASA-related fields, are awarded graduate degrees at their respective universities in the STEM fields.
- Build an intellectual network between NASA and higher education institutions by allowing faculty greater access and knowledge of NASA’s research opportunities.

The solicitation is usually released in NSPIRES in Fall of each year.
Fellowship Opportunities

NASA Aeronautics Scholarship and Advanced STEM Training and Research Fellowship (AS&ASTAR)

- 2016 NASA Education Research Announcement (NRA): Aeronautics Scholarship and Advanced STEM Training and Research (AS&ASTAR) Fellowship has closed for this 2016. The solicitation was found at this link: https://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solld={87B17E76-1FDD-A38A-6A69-050E4EB3C8A4}&path=open. The selections will be posted in September, 2016 on NSPIRES.

- Questions concerning NASA Education Fellowship activities, may be directed to Elizabeth Cartier, NASA Fellowships and Scholarships Deputy Program Manager, Ames Research Center, Office of Education, Moffett Field, CA 94035; E-mail: elizabeth.a.cartier@nasa.gov.
**Scholarships** are competitive awards to support undergraduates in their STEM academic endeavors, by providing tuition funding and access to NASA STEM discipline employees.
Scholarships Criteria

Students should be:
- early in their undergraduate studies,
- pursuing Bachelor’s degrees in relevant NASA-related disciplines at accredited U.S. universities.
NASA Education Scholarship

• The NASA Education Scholarship Program, formally known as the NASA Undergraduate Aeronautics Scholarship and the NASA MUREP Scholarship Program, is not making new awards for the academic year 2016-2017 due to funding and programmatic restructuring.

• Questions concerning NASA Education Scholarship activities, may be directed to Elizabeth Cartier, NASA Fellowships and Scholarships Deputy Program Manager, Ames Research Center, Office of Education, Moffett Field, CA 94035; E-mail: elizabeth.a.cartier@nasa.gov.

• The 2017 session dates are available in the ‘Internships for Students’ page on https://intern.nasa.gov
NASA Internships, Fellowships, and Scholarships (NIFS)
Additional Slides
• NASA Earth and Space Science Fellowship (NESSF)
• NASA Space Technology Research Fellowships (NSTRF)
• Graduate Internships
NASA’s Science Mission Directorate (SMD)

NASA Earth and Space Science Fellowship (NESSF)

This opportunity solicits graduate students seeking degrees in Earth and space sciences, or related disciplines, at respective institutions. The purpose of NESSF is to ensure continued training of a highly qualified workforce in disciplines needed to achieve NASA’s scientific goals:

- **Understand the Sun and its interactions with Earth and the solar system, including space weather;**
- **Advance knowledge of Earth as a system to meet the challenges of environmental change and to improve life on our planet;**
- **Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere; and**
- **Discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.**

The solicitation is usually released in NSPIRES in the Fall of each year.
NASA Space Technology Research Fellowships (NSTRF)

This opportunity solicits applications from graduate student researchers, who show significant potential to contribute to NASA's goal of creating innovative new space technologies for our Nation's science, exploration, and economic future.

Students perform innovative space technology research and seek to improve America's technological competitiveness by providing the Nation with a pipeline of innovative space technologies.

NASA's Space Technology efforts can be defined as the orderly pursuit of the following objective:

- **Transform NASA missions and advance the Nation’s capabilities by maturing crosscutting and innovative space technologies.**

The solicitation is usually released in NSPIRES in the Fall of each year.
NASA Graduate Internships

NASA internships are available to high school through graduate level students attending full-time programs appropriate to the NASA opportunity for which they receive an offer.

Graduate internships are educational hands-on opportunities that provide unique NASA-related research and operational experiences for graduate students.

Internships integrate participants with career professionals emphasizing mentor-directed, degree-related, work-place task completion. NASA internships consist of at least 400 contact hours. They may be full-time, or part-time and can take place at a NASA facility, or anywhere NASA-related activities are ongoing.
NASA Graduate Internship Eligibility

- Must be attending full-time accredited program
- U.S. citizenship required for most internship opportunities
- Must be enrolled full-time in a degree-granting course of study appropriate to NASA's long-term professional workforce needs
- Must have minimum GPA of 3.0 on a 4.0 scale or equivalent.
The NASA Postdoctoral Program (NPP) provides early-career and more senior scientists the opportunity to share in NASA's mission, to reach for new heights and reveal the unknown so that what we do and learn will benefit all humankind.

NASA Postdoctoral Fellows work on 1 to 3 year assignments with NASA scientists and engineers at NASA centers and institutes to advance NASA's missions in earth science, heliophysics, planetary science, astrophysics, space bioscience, aeronautics, engineering, human exploration and space operations, astrobiology, and science management.

NASA Postdoctoral Program Fellows contribute to our national scientific exploration, confirm NASA's leadership in fundamental research, and complement the efforts of NASA's partners in the national science community.
Eligibility

• Completed the requirements for a Ph.D. or an equivalent doctorate degree before beginning the fellowship.
• U.S. citizenship, Lawful Permanent Resident (LPR) status, or the Exchange Visitor J-1 Visa (research scholar only) before beginning the fellowship. An H-1B status is not acceptable because the NPP is not an employment program. You are eligible to apply for the NPP while holding the F-1 status. However, if you are selected for an appointment, you must change your status to one listed above.
• Since each NPP Fellowship is tied to a specific research opportunity located at a NASA Center or program institute, you must relocate to the Center or program institute that supports the opportunity to which you were accepted. In the case of virtual Centers such as the NASA Astrobiology Institute, you must relocate to the university location of your advisor as listed on the research opportunity. Establishing and maintaining residency at the Center or at the location of the advisor is required to begin the appointment and to remain in the program.
Office of Diversity and Equal Opportunity

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Send your questions for this session to: civilrightsinfo@nasa.gov
Increasing STEM-Workforce Diversity

- Forbes Insights Study: Fostering Innovation Through a Diverse Workforce - Over 300 executives surveyed*
  
  ★ Diversity/Inclusion efforts should **start** with senior management
  
  ★ Organizations must be convinced that diversity is the key to innovation and industry disruption

- National Center for Women & Information Technology**
  
  ★ Focus on the company culture - not just the pipeline
  
  ★ “Majority-Group” members must get involved in shaping the culture

- The STEM workforce includes US military careers too - I am living proof!

Silicon Valley Tech Companies have started to incorporate diversity as an integral component of their corporate strategy ...
# STEM-related Occupation Statistics

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2012 Jobs</th>
<th>2022 Jobs</th>
<th>% Increase</th>
<th>Median Salary in 2012</th>
</tr>
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<tbody>
<tr>
<td>Computers &amp; Math</td>
<td>2.8 million</td>
<td>3.4 million</td>
<td>18%</td>
<td>$76,270</td>
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<tr>
<td>Architecture &amp; Engineering</td>
<td>1.8 million</td>
<td>1.9 million</td>
<td>9.3%</td>
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<tr>
<td>Life, Physical, &amp; Social Sciences</td>
<td>.55 million</td>
<td>.6 million</td>
<td>8.1%</td>
<td>$106,840 (physicists)</td>
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<tr>
<td>Farming, Fishing, &amp; Forestry</td>
<td>.017 million</td>
<td>.016 million</td>
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</tr>
</tbody>
</table>

Office of Diversity and Equal Opportunity

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NASA’s Pathways Program

Mission STEM – Increasing Diversity in STEM – The STEM Pipeline

August 9, 2016
Pathways Programs were established government-wide in 2012

Components:
- Pathways Intern Program
- Pathways Recent Graduate Program
- Presidential Management Fellows Program
The NASA Pathways Intern Program is for current students and individuals accepted for enrollment in a qualifying educational program.

The NASA Pathways interns are enrolled in a variety of educational institutions and have paid opportunities to work here and explore Federal careers while still in school.

This program exposes students to jobs in the Federal civil service by providing meaningful development work at the beginning of their career, before their career paths are fully established.

Most interns are eligible for conversion to career-conditional appointments in the Federal service upon graduation and completion of program requirements. Others, who are given temporary (a.k.a. “NTE”) appointments, are not eligible to convert (these positions are typically clerical).

Eligibility Requirements:
- NASA Pathways interns meet applicable qualification requirements, either (1) OPM qualification standards; or, (2) NASA's Aeronautics, Scientific, and Technical (AST) qualification standards for engineering and science positions; or Agency developed qualification standards.
- Interns must maintain at least an overall 2.9 GPA.
- Interns are United States citizens.
Key Differences: Pathways vs SCEP (“Co-op”)

- Public Notice and competitive announcement process
- Veterans Preference
- Increased competition for positions (approximately 100 applicants for each Pathways Intern selection)
- Transition from “recruiting” to “outreach” (hiatus in on-the-spot hiring at campus recruiting events)
- Changed Relationships with Universities
  - Formal Agreements between NASA and universities are no longer required
  - Weakened of partnerships between NASA and key academic partners
  - Limited ability to target hiring at HBCUs, HACUs, etc.
- Direct hiring from NASA Intern, Fellowship, Scholarship (NIFS) no longer possible
Demographic Overview of the Intern Program

- NASA Pathways Intern Program
  - Hires about 150-200 interns per year at the NASA Centers
  - Roughly 2/3 of interns are S&E, 1/3 business/mission support
  - 40% graduate interns, 60% undergraduate interns
  - Receives about 15,000-20,000 applications per year
  - Converts about 60% of interns within four years of hire
  - Currently has nearly 500 interns, enrolled at 200 universities, in 46 states + DC
The NASA Pathways Recent Graduates Program is for individuals who have recently graduated from qualifying educational institutions or programs.

This developmental program lasts one year. After one continuous year of service and having demonstrated successful job performance, participants may non-competitively convert to term or permanent competitive service jobs.

The Program provides opportunity to individuals who lack experience to participate in jobs in the Federal civil service at the beginning of their careers, before their career path is fully established.

Eligibility Requirements:

- Applicants must have completed, within the previous 2 years, a qualifying associates, bachelors, masters, professional, doctorate, vocational or technical degree or certificate from a qualifying educational institution. A veteran, who, due to military service obligations was unable to apply within 2 years of receiving their degree, has as much as 6 years after degree completion to apply.

- NASA Recent Graduates meet applicable qualification requirements, either (1) OPM qualification standards; or, (2) NASA's Aeronautics, Scientific, and Technical (AST) qualification standards for engineering and science positions.

- Recent Graduates are United States citizens.
The Pathways Presidential Management Fellows Program is for individuals who have completed a qualifying advanced degree (e.g., graduate or professional degree) within two years of the opening date of the PMF announcement.

OPM makes eligibility determinations and identifies finalists eligible for consideration.

PMFs may be appointed at the GS-9, GS-11 or GS-12 level. PMF appointments are limited to two years.

PMFs may be converted to career/career-conditional appointments upon completion of a rigorous two-year paid program that includes:

- At least 80 hours of formal, interactive training per year (for a total of 160 hours) that advances the PMF’s competencies in the occupation or functional discipline where they would most likely be placed.
- At least one rotational or developmental assignment of 4 to 6 months, with management and/or technical responsibilities.
- Work with a senior-level Mentor.

NASA collaborated with OPM to develop the “PMF-STEM” track in 2014.

Eligibility Requirements:

- NASA PMFs meet applicable qualification requirements, either (1) OPM qualification standards; or, (2) NASA's Aeronautics, Scientific, and Technical (AST) qualification standards for engineering and science positions.
- PMFs are United States citizens.
Questions
MissionSTEM
21st Century Civil Rights Technical Assistance for Science, Technology, Engineering, and Mathematics

Office of Diversity and Equal Opportunity
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Send your questions for this session to: civilrightsinfo@nasa.gov
Highlighting How the Federal Civil Rights Laws Relate to STEM Programs at Institutions of Higher Education

This presentation provides general information and does not represent a complete recitation of the applicable law and OCR policy in this area. It does not address specific issues of compliance because determinations of compliance depend on specific facts and are made on a case-by-case basis. The language used in these slides is approved for purposes of this presentation only and should not be used for other purposes.
Overview of the applicable Federal civil rights laws enforced by OCR

- Highlights of how these laws relate to STEM
  - Admissions
  - Recruitment/Outreach
  - Retention
  - Additional considerations for students with disabilities

- Resources

- Contacting OCR
OCR enforces federal civil rights laws that prohibit discrimination on the basis of:

<table>
<thead>
<tr>
<th>Race, color, national origin</th>
<th>Title VI of the Civil Rights Act of 1964</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Title IX of the Education Amendments of 1972</td>
</tr>
</tbody>
</table>
| Disability                   | Section 504 of the Rehabilitation Act of 1973  
                                Title II of the Americans with Disabilities Act of 1990 |
Admissions and Eligibility Criteria

- Must not deny admission to students on the basis of race, sex, or disability.
- Must not condition admission of students with disabilities on foregoing aids/services.
- Must not use eligibility criteria that have an unjustified disparate impact based on race, sex, or disability.
What can schools do to increase the enrollment of underrepresented students in STEM programs?

- Eliminate prerequisites for admission
  - To meet the needs of students entering with varying backgrounds, the school could create multiple first year courses that students can select based on their level of prior experience.
- Ensure there is diversity on the admissions committee
- Review admissions criteria to ensure they are neutral in application or effect and are valid predictors of success
- Consider using a multi-factorial admissions process so that no one criterion is given undue weight
Admissions and Eligibility Criteria

- Special Considerations for Race – Voluntary Use of Race
  - May consider an applicant’s socioeconomic status, first-generation college status, geographic residence, or other race-neutral factors
  - May give special consideration to applicants who went to a low-performing school or have overcome other hardships
  - May guarantee admission to a top percentile of students graduating from all in-state high schools
  - May preference students of all races who graduated from high schools with certain socioeconomic or racial composition
  - May consider the race of individual students among other factors in admissions if narrowly tailored to a compelling interest
Recruitment and Outreach

- Must ensure that STEM recruitment materials are free of bias and stereotypes
What can schools do to improve recruitment of underrepresented students?

- Target schools or districts that are low performing, have high dropout rates, or are geographically underrepresented

- Target schools, districts, or areas with many potential applicants of groups underrepresented in the school’s applicant pool

- Advertise in media, at community events, or conferences targeted at underrepresented groups
Recruitment and Outreach

What can schools do to improve recruitment of underrepresented students?

- Partner with ESE schools in your community to support the preparation of all students for higher education in STEM fields
- STEM departments may engage in outreach during events for prospective students explaining the benefits of specific STEM careers and counteract any stereotypes about the fields
- Design STEM introductory courses to appeal to a diverse group of students, including presentations from diverse STEM academics
- Ensure recruitment materials and websites for STEM programs highlight diversity
Retention

- Schools seeking the benefits of diversity not only must enroll a diverse group of students, but must also retain those students.

- Schools may operate mentoring, tutoring, retention, and support programs for enrolled students who may need additional assistance to succeed.
What can schools do to improve retention of underrepresented students?

- Provide mentoring, tutoring, and academic support to all enrolled students at risk of not completing their program
- Provide support programs that are open to all students with content of particular interest to a group targeted for retention (e.g., highlighting accomplishments of groups that are underrepresented in STEM)
- Provide training to faculty, staff, and students on the effects of implicit bias
What can schools do to improve retention of underrepresented students?

Examine the process for assigning and changing advisors

- Is the process for assigning advisors to students non-discriminatory?
- Can students request to change advisors?

Provide “life counselors” in addition to formal faculty advisors to all students.

- These counselors provide advisement related to social networking and career choices.
- They benefit the entire student body, and particularly underrepresented groups who may feel isolated.
Additional Considerations for Students with Disabilities

- Academic Adjustments
  - Schools must make modifications to academic requirements to ensure that such requirements do not discriminate or have the effect of discriminating on the basis of disability
  - Modifications may include:
    - Length of time permitted to complete degree requirements
    - Adaption of the manner in which specific courses are conducted
Academic Adjustments

- Schools may not impose other rules on students with disabilities that have the effect of limiting the participation of students with disabilities:
  - Prohibiting tape recorders or guide dogs in classrooms
Additional Considerations for Students with Disabilities

- Academic Adjustments
  - Provide auxiliary aids to students with disabilities as necessary
    - Taped texts
    - Interpreters for hearing impaired students
    - Readers for students with visual impairments
    - Classroom equipment adapted for use by students with manual impairments
Additional Considerations for Students with Disabilities

Accessible Technology

- May not require the use of technology in a classroom environment when the technology is inaccessible to SWDs unless accommodations or modifications that permit them to receive all the educational benefits provided by the technology in an equally effective manner are provided

  • Acquire the same information,
  • Engage in the same interactions, and
  • Enjoy the same services
OCR Resources

- Title IX STEM powerpoint
- Title IX Resource Guide
- Resources on Supporting Racial Diversity
  www.ed.gov/ocr/frontpage/pro-students/issues/roi-issue07.html
- Guidance on Use of Electronic Book Readers and Other Emerging Technologies
  www.ed.gov/ocr/docs/dcl-ebook-faq-201105.html
  www.ed.gov/offices/list/ocr/docs/504-qa-20100629.pdf
Contacting OCR

- OCR website
  www.ed.gov/ocr

- Contact Information for OCR Headquarters
  (800) 421-3481
  OCR@ed.gov

- Contact Information for OCR Regional Offices
  https://wdcrobcolp01.ed.gov/CFAPPS/OCR/contact_us.cfm
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The Critical Role of Diversity and Inclusion in STEM Disciplines

NASA MissionSTEM Summit
August 9, 2016

Lorelle L. Espinosa, Ph.D.
Assistant Vice President for Policy Research and Strategy
American Council on Education
Overview of Remarks

• Diversity in a 21st century context and the research underpinnings
• Race-conscious and race-neutral approaches
• The role of campus climate, including for women of color in STEM
• Models for institutional practice
Race, Class, & College Access

Achieving Diversity in a Shifting Legal Landscape

Lorelle L. Espinosa, Matthew N. Gaertner, and Gary Orfield
Race is an Admissions Consideration Across the Selectivity Spectrum
What Are the Most and Least Widely Used Diversity Strategies? (racial/ethnic, socioeconomic diversity)
Which Diversity Strategies Are Perceived as Most and Least Effective? (racial/ethnic diversity)
“While numbers are necessary for realizing the benefits of diversity, they are not alone sufficient. What we need moving forward is a shift in our understanding of diversity as solely a ‘numbers game.’ ”

– Liliana Garces and Uma Jayakumar
Early Work on Climate

Race relations and racial attitudes on college campuses have been studied since late 1960s

- Sedlacek & Glenwood (1967) assessed racial attitudes by college students
- Burbach & Thompson (1973) explored alienation as a contributor to a campus’ climate
- Pfeifer & Schneider (1974) put forth seminal work on “university climate”
Defining Campus Climate

“...the current attitudes, behaviors, and standards and practices of employees and students of an institution”

Campus Climate & Sense of Belonging for Women of Color
Dawn R. Johnson (2012)

- Transformative practice requires that institutions take responsibility for the transformation of STEM environments
- Faculty from dominant groups are especially critical
- Supportive academic and social climates within the residence hall are the strongest contributors to overall sense of belonging
- Perceptions of a positive campus racial climate are also significant
Inside the Double Bind
A Synthesis of Empirical Research on Undergraduate and Graduate Women of Color in Science, Technology, Engineering, and Mathematics

MARIA ONG, CAROL WRIGHT, LOWELL EPPINSO, AND GARY OSTER

In this article, Maria Ong, Carol Wright, Lowell Eppins, and Gary Osterfield reviewed forty years of scholarship on the postsecondary educational experiences of women of color in science, technology, engineering, and mathematics (STEM). Their synthesis and analysis of the research provides insights into the factors that influence the retention, persistence, and achievement of women of color in STEM fields. They argue that the current underrepresentation of women of color in STEM fields represents an increasingly underutilized pool of our nation’s human capital and hence constrains economic equity in the U.S. educational and employment systems. They refute the prevalent stereotypes that underrepresented minority women are less interested in pursuing STEM fields than their male counterparts. Moreover, they present a complex portrait of the varied factors that influence the undergraduate and graduate experiences of women of color in STEM fields. Finally, the authors discuss the policy implications of their findings and highlight gaps in the literature where future research is needed, providing a knowledge base for educators, policy makers, and researchers to continue the mission of advancing the status of women of color in STEM.

Symposium
Unraveling the Double Bind: Women of Color in STEM
Inside the Double Bind
Ong, Wright, Espinosa, & Orfield (2011)

- Campus climate plays a critical role in retention & satisfaction of women in STEM
- Family & community support one of most salient factors for degree completion
- Student-faculty relationships and peer support networks are also critical
- Women of color often use their status to harness personal empowerment

Competence  Performance  Recognition

Science Identity

What are students demanding?

All Institutions
### ACE Pulse Point Analysis

**Actions taken in the last five years (2-year and 4-year institutions)**

<table>
<thead>
<tr>
<th>Action</th>
<th>All Institutions</th>
<th>2-Year</th>
<th>4-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed policies and/or procedures</td>
<td>47%</td>
<td>44%</td>
<td>48%</td>
</tr>
<tr>
<td>Resources for racial diversity initiatives</td>
<td>63%</td>
<td>61%</td>
<td>63%</td>
</tr>
<tr>
<td>Resources for minority student support services</td>
<td>62%</td>
<td>60%</td>
<td>62%</td>
</tr>
<tr>
<td>Initiatives to increase diversity among students, faculty, and/or staff</td>
<td>76%</td>
<td>74%</td>
<td>77%</td>
</tr>
<tr>
<td>Public acknowledgment of issues related to racial climate on campus</td>
<td>51%</td>
<td>29%</td>
<td>58%</td>
</tr>
<tr>
<td>Diversity/cultural competency training for students, faculty, and/or staff</td>
<td>62%</td>
<td>69%</td>
<td>58%</td>
</tr>
<tr>
<td>Put in motion curricular revision or development</td>
<td>33%</td>
<td>31%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Compared to three years ago, has the racial climate on your campus become more of a priority, about the same, or less of a priority? (2-year and 4-year institutions)

2% 1% 53% 44% 44% 55%

Less of a priority
About the same
More of a priority

Museus’ Culturally Engaging Campus Environments (CECE) Model

Figure 1. The Culturally Engaging Campus Environments (CECE) Model of College Success

Culturally Engaging Campus Environments

- Cultural Relevance
  - Cultural Familiarity
  - Culturally Relevant Knowledge
  - Cultural Community Service
  - Cross-Cultural Engagement
  - Cultural Validation
- Cultural Responsiveness
  - Collectivist Orientations
  - Humanized Environments
  - Proactive Philosophies
  - Holistic Support

Individual Influences

- Sense of Belonging
- Academic Dispositions
  - Self-Efficacy
  - Motivation
  - Intent to Persist
- Academic Performance

Pre-College Inputs

- (Demographics, Initial Academic Dispositions, Academic Preparation)

External Influences

- (Faculty, Finances, Employment)

College Success Outcomes

- Learning Development
- Persistence
- Degree Completion
Museus’ Culturally Engaging Campus Environments (CECE) Model

Cultural Relevance
- Cultural Familiarity
- Culturally Relevant Knowledge
- Cultural Community Service
- Meaningful Cross-Cultural Engagement
- Cultural Validation
Museus’ Culturally Engaging Campus Environments (CECE) Model

Cultural Responsiveness

- Collectivist Cultural Orientations
- Humanized Educational Environments
- Proactive Philosophies
- Holistic Support
Garces and Jayakumar (2014) Dynamic Diversity

Four key areas to develop inclusive environments:
1. Assess racial climate
2. Attend to institutional history and context
3. Break down barriers to cross-racial engagement
4. Nurture quality cross-racial interactions
Thank you!
lespinosa@acenet.edu
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Museum of Science, Boston

Inclusion through organizational learning
“One of the most pervasive messages of my childhood was, ‘Not for you.’ That’s something that’s incredibly destructive for the life of a child. Places like science museums can dispel those messages more than almost any place else. I remember my few visits to museums as just wonderful. I believe everybody should have that experience. And I do mean everybody.”

– Betty Davidson, Ph.D.
Our vision for access

The Museum of Science, Boston is committed to the inclusion of people with disabilities and will create an environment that is inviting, engaging, and accessible for everyone.
What does this mean in practice?
Focusing on inclusion
to ensure all programming is accessible to a broad audience
Employing universal design
when designing environments for staff and visitors

**Engineering process**

**Design**
- Choose the depth at which you want your bottle to float
- Choose from surface, middle or bottom

**Build**
- Attach floats and weights to your sensor

**Test**
- Place your sensor into the water
- Does it float where you expected?

**Improve**
- Adjust your design and test it again
- If you were successful, try a different design

---

**Engineer a river sensor**
Design a sensor bottle that floats at a specific depth to monitor river health.

**Plan**
- Choose a goal depth and select materials

**Create**
- Attach floats and weights

**Test**
- Place sensor in the water tube

**Improve**
- Change your design and test again
Identifying audiences
who need additional support through programming
Embedding accessibility into all major initiatives
Targeting key resources and amenities for enhanced accessibility
Involving people with disabilities in our work as staff members, volunteers, and consultants.
Offering professional development for all Museum staff members
Experimenting with new approaches
deriving innovative solutions to field-wide problems
“Our story”

Betty Davidson, Fearless Leader

Created an accessible exhibition, better for everyone

Voila! There was change!
Is that the whole story?
What facilitates change?

Continuous improvement and change through organizational learning

• Involve people with disabilities in their work
• Embed inclusive practices in the work and regular communication
• Engage in on-going experimentation and reflection about inclusive practices
• Promote inclusive practices as something that benefits people with and without disabilities
Museum of Science, Boston

Christine Reich, creich@mos.org
MissionSTEM
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