



Working with Dept. of Energy Workforce Development Programs: Becoming Competitive

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White House Init. On Tribal Colleges & Universities

ACI Math & Science Education Workshop

November 27-28, 2006

Las Vegas, NV





Overview

- We will discuss current science education and workforce development programs at the Dept. of Energy (DOE), opportunities from recent and pending legislation, and current diversity outreach. There should be dialogue on how we can work with tribal colleges and universities to become competitive and to increase competitiveness of our nation's math and science students.





Who and Why?





What is the Office of Science?

1. **Advanced Scientific Computing Research**
Research and application of advanced computational tools
2. **Basic Energy Sciences**
Principal sponsor of fundamental research for the Nation in materials sciences and engineering, chemistry, geosciences, and bioscience as it relates to energy.
Synchrotron light sources, neutron sources, electron microscopy, etc.
3. **Biological & Environmental Research**
Radiation and health, human and environmental, founder of the Human Genome Project
4. **Fusion Energy Sciences**
Advanced plasma science, fusion science, and technology
ITER
5. **High Energy Physics**
Investigating elementary particles and forces to understand energy and matter
6. **Nuclear Physics**
Investigate properties and interactions of atomic nuclei and nuclear matter





Why should DOE be involved in education?

“...just as NASA inspires school children with the excitement and beauty of space sciences, just as NIH similarly reaches out to schools to explain the frontiers and the benefits of the life sciences, so should DOE use its vast frontier technological facilities and the collaboration of scientists from all over the world to inspire students and teachers with the rich frontiers of the molecular, atomic, nuclear and sub-nuclear worlds. The Department’s Laboratories and university programs offer unique resources for mounting aggressive programs to support the nation’s students and teachers in science, mathematics and engineering.”

- Charles M. Vest *et al.*, SEAB Task Force on the Future of Science Programs, *Critical Choices: Science, Energy, and Security*, October 13, 2003





What is WDTS?

- Office of Science
 - Office of Workforce Development for Teachers & Scientists
- Responsible for administering Science Education Programs at the National Laboratories
 - K-12 Programs
 - Undergraduate Programs
 - Graduate Programs (for teachers)
 - Faculty Programs (for teachers)
- Funding from Congress





Why is DOE Interested in Workforce Development?

Final Report of the Secretary of Energy Advisory Board's Task Force on the Future of Science Programs at the Department of Energy -- October 13, 2003

"The Department should dramatically enhance its role in educating and training future scientists and engineers, drawn from America's diverse population, for careers in DOE-related fields. The Department should establish strong programs of undergraduate, graduate, and postdoctoral fellowships or traineeships in the physical sciences and engineering and should strengthen its outreach at the K-12 level."

Final Report of the Secretary of Energy Advisory Board's Science and Mathematics Education Task Force -- May 5, 2006

The Task Force recommends that the Department of Energy reestablish an Office of Education reporting directly to the Secretary of Energy, to oversee all educational activities. It should call for the U.S. Congress to commit to increasing funding for education within the DOE appropriate to the magnitude of the task and commensurate to the size of the agency, funds that should be earmarked solely for K-12 STEM education.

DOE should also recommend to the President that he call on all Executive Branch departments and independent agencies to renew, invigorate and coordinate K-12 STEM educational outreach programs. DOE should take a leadership role in developing educational efforts and materials together with other Federal agencies and organizations, and according to "best practices" in metrics for assessing the effectiveness of both teacher professional development and student education.





Why is DOE Interested in Workforce Development?

- Inspector General Report (July 2001) states “the Department could face a shortage of nearly 40 percent in its science and technical classifications within five years.”
- DOE is the largest federal agency funding basic research in physical sciences. We need to ensure we have the workforce to accomplish this research.





Used Energy Related Laboratory Equipment Program

- Excess laboratory equipment from Department of Energy sites to colleges & universities
- No cost for ERLE equipment
- Colleges & universities responsible for shipping
- On-line system

WDTS Website: www.scied.science.doe.gov





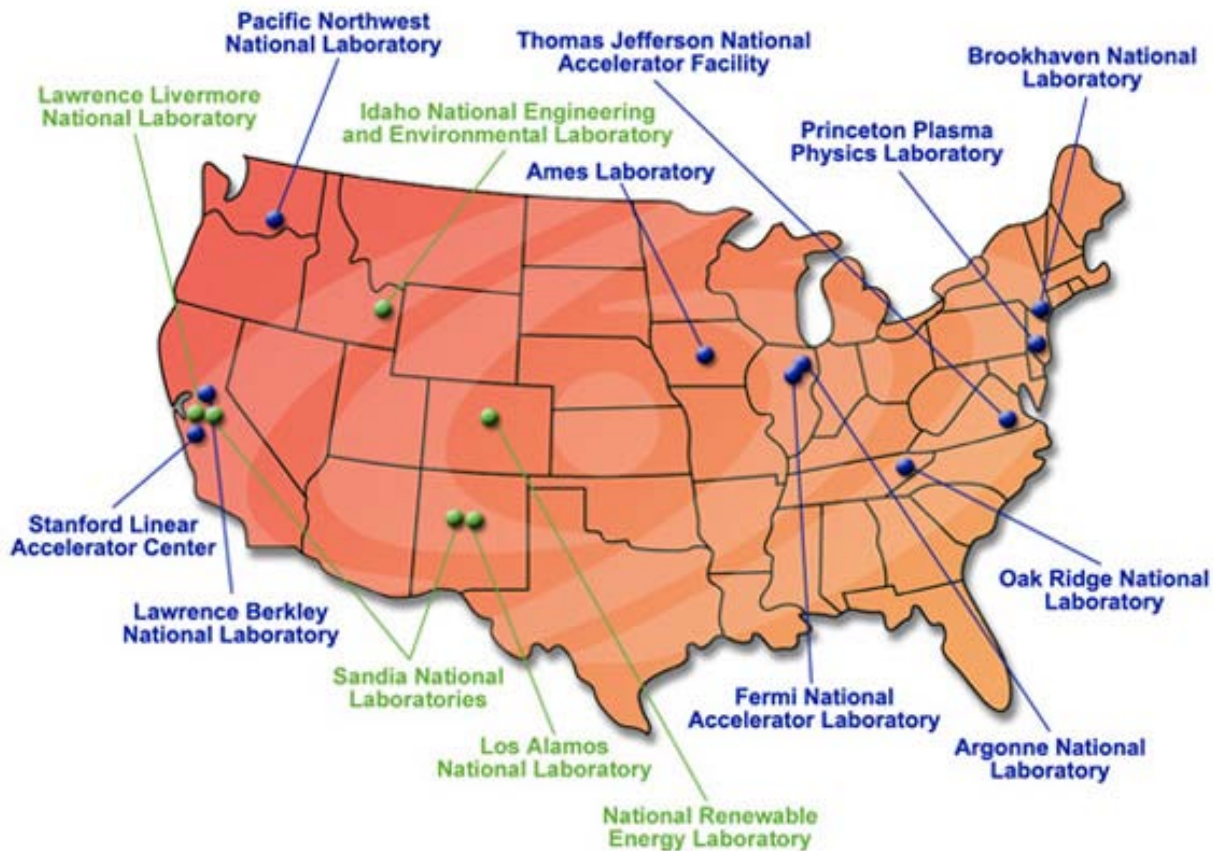
Other DOE Education Programs

- Individual DOE program offices fund Education programs in their specialty areas.
 - Undergraduate Internships
 - Graduate Fellowships
- www.science.gov for internship programs throughout the government





Where are the National Labs?







What types of research?

- Physics
 - Material Science
 - Computer Science
 - Engineering
 - Environmental, Mechanical, Nuclear, Civil, Electrical, Industrial, Biomechanical
 - Medical Imaging
 - And much, much more!
- Biology
 - Chemistry
 - Computer Science
 - Nuclear Science
 - Science Policy
 - Waste Management





National Laboratory Education Staff

- Most DOE National Laboratories have an Office of Education
 - Scientists
 - Educators
- Administer Office of Science science education programs
- Administer other science education programs





Goals of WDTS

1. Grade School - to - Grad School approach for attracting students into the STEM (science, technology, engineering, and math) pathway
 - a. Science Bowl Activities/K-12 Teacher Professional Development
 - b. Undergraduate Internships
 - c. Graduate Fellowships
 - d. Faculty Research Opportunities





Goals of WDTS

2. Use the DOE National Labs as a Resource
 - a. Safe, well-established, well-supported places for big science
 - b. Large, first-class facilities and instruments for cutting-edge science
 - a. Advanced Photon Source, Relative Heavy Ion Collider, Spallation Neutron Source (new)
 - c. Strong human resources for mentoring
 - d. Community of government, university, and private resources





Interagency Collaborations

- National Science Foundation Memorandum of Understanding - supports funding for our internships/fellowships
- Einstein Fellows at:
 - National Science Foundation (NSF)
 - National Aeronautics and Space Administration (NASA)
 - National Oceanic and Atmospheric Administration (NOAA)
 - National Institutes of Health (NIH)
- NIH Careers website





What are the current programs?





Pre-College Activities

- National Middle School Science Bowl
 - Academic Tournament
 - Model Fuel Cell Car Races
- National Science Bowl®
 - Saturday Science Seminars
 - Model Fuel Cell Car Races
 - Academic Tournament





National Science Bowl®

- National Science Bowl® began in 1991
 - To encourage students to study math & science
- Regional events hosted/coordinated by DOE sites, colleges & universities, utilities, other educational institutions; occur January to March
- All-expense-paid trip to Washington, D.C. for the National finals on April 26-30, 2007
 - Hydrogen Fuel Cell Model Car Challenge
 - Science Day
 - Academic Competition





Middle School Science Bowl

- Middle School Science Bowl began in 2000
- Regional events may be either academic only or academic plus Hydrogen Fuel Cell Car competition
- National MSSB finals - June 21-24, 2007, Denver, Colorado





Undergraduate Laboratory Research Internships



Science Undergraduate Laboratory Internship

Community College Institute



Pre-Service Teacher Program





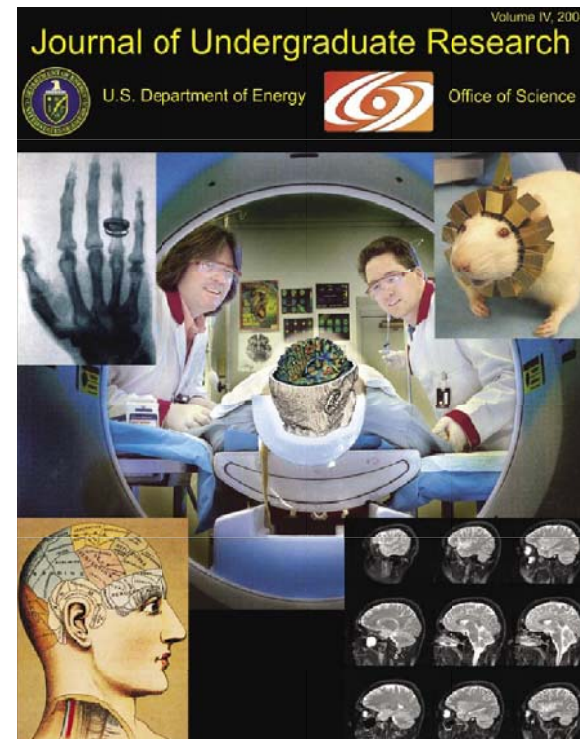
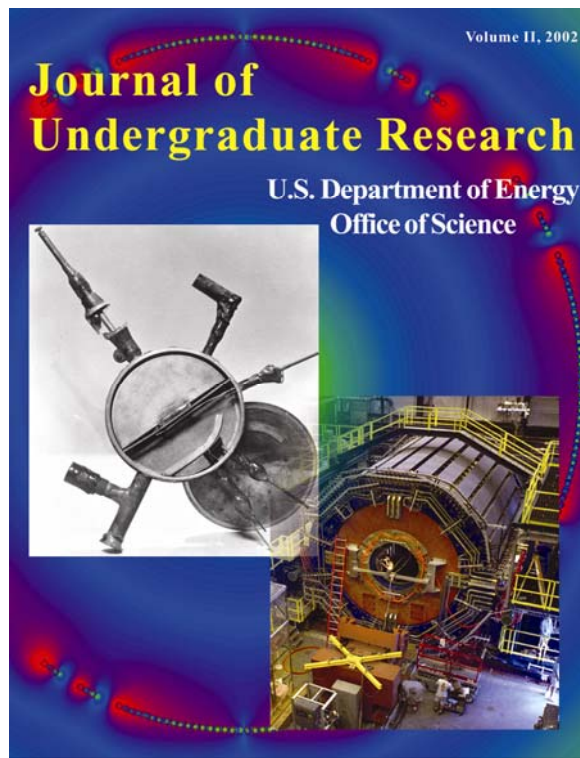
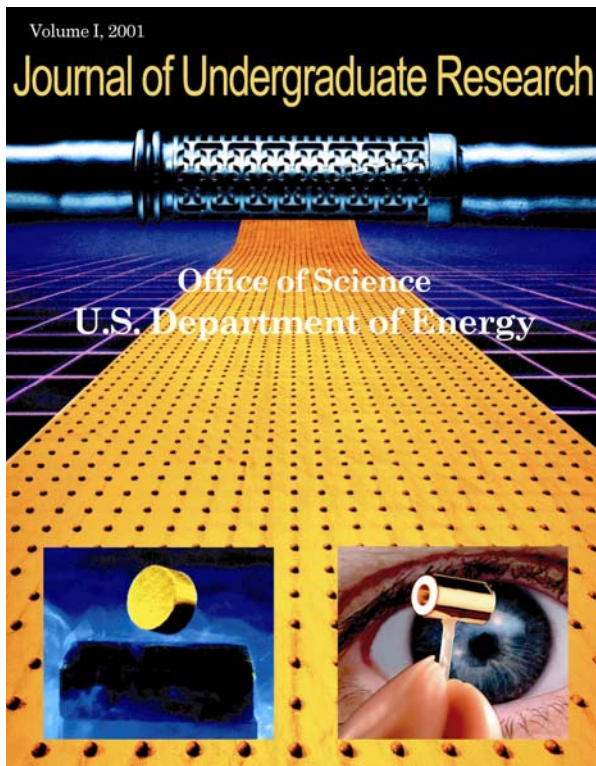
Undergraduate Internships

- Matched with laboratory scientist or engineer
- \$400 per week stipend
- \$75 per week housing allowance
- Round trip travel to laboratory
- Required Deliverables
 - Research abstract
 - Research paper (10 pages)
 - Pre & Post questionnaires
 - Pre-Service Teacher Students - Education Module/Journal/Digital Portfolio
- Publish *Journal of Undergraduate Research*





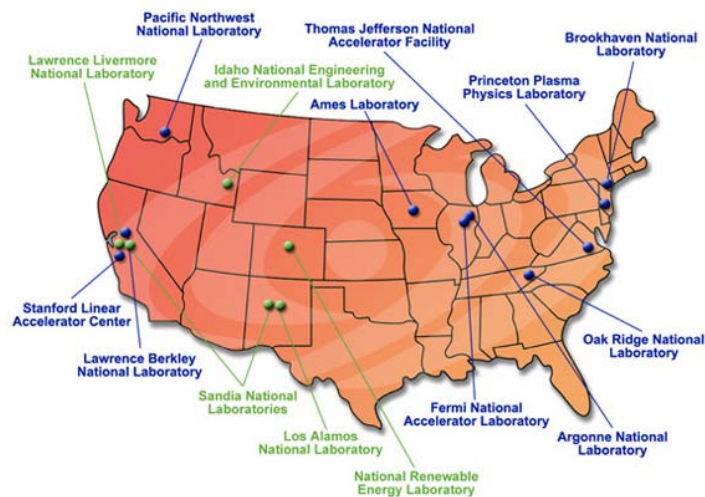
Journal of Undergraduate Research





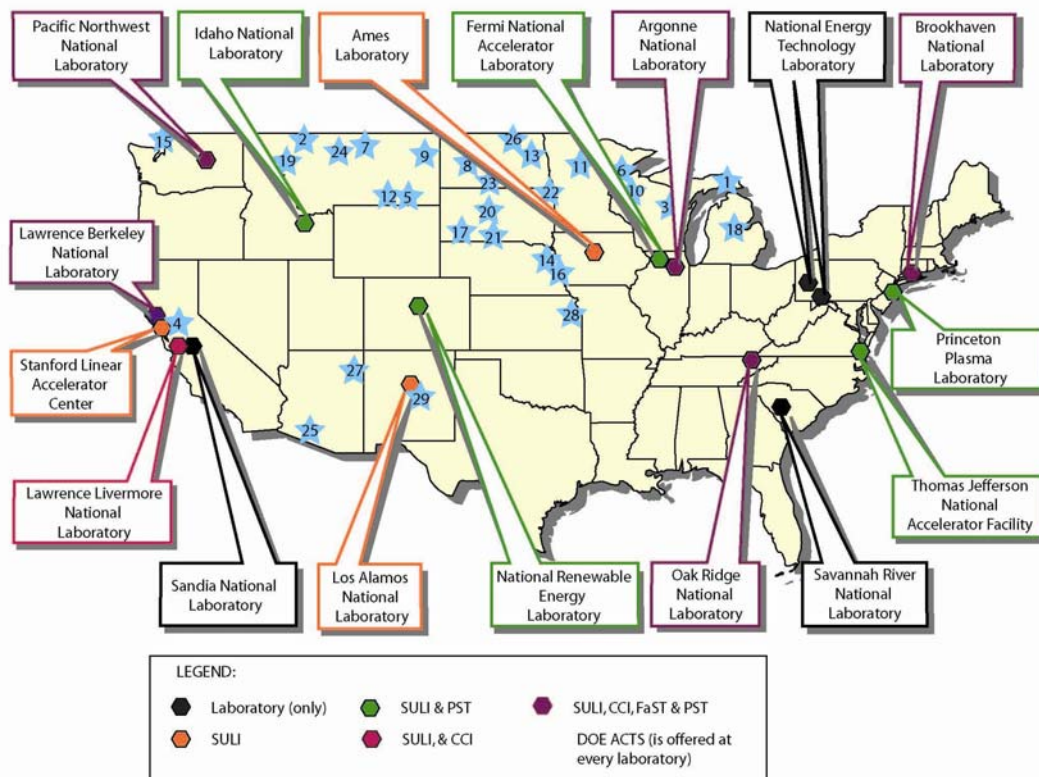
Where are these programs located?

- You do NOT have to apply to the lab that is closest to you! Funding for travel expenses is included.





Where are the Tribal Colleges and Universities?





Bureau of Indian Education-Funded Colleges and Universities

Name	State	Name	State
★ 1 Bay Mills Community College	MI	★ 16 Nebraska Indian Community College	NE
★ 2 Blackfeet Community College	MT	★ 17 Oglala Lakota Community College	SD
★ 3 College of Menominee Nation	WI	★ 18 Saginaw-Chippewa Tribal College	MI
★ 4 D-Q University	CA	★ 19 Salish Kootenai College	MT
★ 5 Dull Knife Memorial College	MT	★ 20 Si Tanka Community College	SD
★ 6 Fond du Lac Tribal & Community College	MN	★ 21 Sinte Gleska University	SD
★ 7 Fort Belknap Community College	MT	★ 22 Sisseton Wahpeton Community College	SD
★ 8 Fort Berthold Community College	ND	★ 23 Sitting Bull College	ND
★ 9 Fort Peck Community College	MT	★ 24 Stone Child Community College	MT
★ 10 Lac Courte Oreilles Ojibwa Community College	WI	★ 25 Tohono O'odhom Community College	AZ
★ 11 Leech Lake Tribal College	MN	★ 26 Turtle Mountain Community College	ND
★ 12 Little Big Horn College	MT	★ 27 Dine College	AZ
★ 13 Cankdeska Cikana Community College	ND	★ 28 Haskell Indian Nations University	KS
★ 14 Little Priest Tribal College	NE	★ 29 Southwestern Polytechnic Institute	NM
★ 15 Northwest Indian College	WA		





Science Undergraduate Laboratory Internships (SULI)



Paid internships for undergraduate students enrolled in two or four year institutions and interested in advancing their scientific and technical expertise and graduate school and career options.

➤ Students placed with mentor scientists and engineers at DOE National Labs for 10 weeks in the summer and 16 weeks during a fall or spring semester term





Some things SULI is NOT:

- SULI is **not** a small program.
 - We placed over 510 undergraduates in 11 labs this summer.
 - We had over 2100 completed applications for these positions.
- SULI is not a job, but an educational experience.
- SULI is **not** just a “resume” builder.
 - Students are paid \$400 per week.
 - Funding is available for travel and housing.





Community College Institute (CCI) In Science and Technology



*Career training internship
in all branches of
science,
mathematics,
and
engineering.*

Community College
students enter the
scientific workforce
and expand their
career options.

Award Winning Program
for College Students

Semi-Finalist for Harvard
Award
"Innovations in American
Government"

Recognized by the White
House Initiative on
Educational Excellence for
Hispanic Americans as an
exemplary program.





Community College Institute

- 10-week summer program at 6 DOE National Labs
- Students are matched with mentors - develop technicians
- Students spend 20% of their time with enhancement activities
 - Career options
 - Writing & presentation skills
 - Seminars
- Partner with American Association Community Colleges





CCI Anecdotes

- “I came away from this experience with a sense of validation that research is my intellectual home and that I eventually can contribute to the research process. Upon graduating with my masters degree, I look to the possibility of working in the area of proteomics research that is focused on solving diseases of the eye.”
 - Angelo Kontgas, Pacific Northwest Natl. Lab
- Lengthy interviews with scientists along with exit surveys indicated that although the scientists found that the CCI students had less formal training in science they were, “more focused”, “more mature” and “more hungry for opportunities” than students from the typical mainstream 4-year colleges.





CCI Anecdotes

- “My interest was electronics engineering technology until I entered this program. Now I know that electronics engineering technology is really just implementation, and electrical engineering is more of the research and design of systems, which is what I want to do. I would not have known this had I not gone through these programs.”
 - Brian Hilson, Oak Ridge Natl. Lab
- Brian spent another 22 weeks at ORNL in the spring and summer of 2002. During that time, his research group was nominated for a significant achievement award at ORNL.
- Brian plans to enroll in the University of North Carolina Charlotte to pursue a Bachelor’s degree in electrical engineering. He owes it all to that first step provided by DOE’s CCI Program.





Pre-Service Teachers (PST)

*Don't just teach science,
math, or technology; Do it!*



Paid summer research internships at one of the National Laboratories. Each intern works with both a research mentor and a Master Teacher.





Pre-Service Teachers (PST)

- To enhance the nation's source of proficient K-12 science, mathematics, and technology teachers
- 10-week summer research internship at 4 National laboratories
- Master Teacher
 - Organizes and presents enrichment activities
 - Works with the student's mentor & laboratory education staff
 - Assists students in transferring laboratory experience to classroom





PST Anecdotes

“Man, I think my work changed my teaching enormously. A lot of high school teachers can't say they had real laboratory experience. I got hands-on work with the latest technology that real scientists are using. When we go into the classroom, we will relate what we did.”

Enrique Lopez
PST Participant 2003
Lawrence Berkeley Lab





PST Anecdotes

The edge PST has given me in my education classes this semester has been incredible! I've been repeatedly asked by my professors how I know things about education that my classmates don't, so I've become well versed in telling them about the PST program. Just last week one of my professors had me do a little presentation in class to advertise the program and I've had tons of people tell me they want to do it so if there's an influx of W[ashington] S[tate] U[niversity] applicants you know who to blame!

Caron Dorman, PST 2003

Pacific Northwest National Lab





How can students improve their chances of selection for programs?

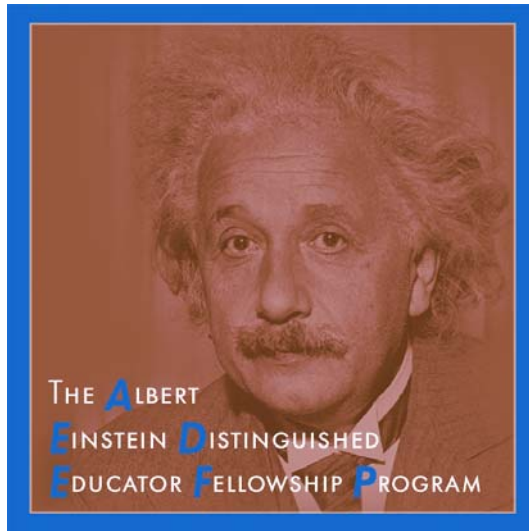
1. Apply early!
 - Applications for summer open each October and should be completed by February 1
 - Get your recommendations in early!
2. Match your lab choice with your research interest
 - Don't apply to a physics lab if you want to do research on medical imaging!
 - Be sure that your application strengths match research going on at the lab
3. Find research from student projects from last year
 - Abstracts are available online - read them!
 - Find the research that most closely matches your interests



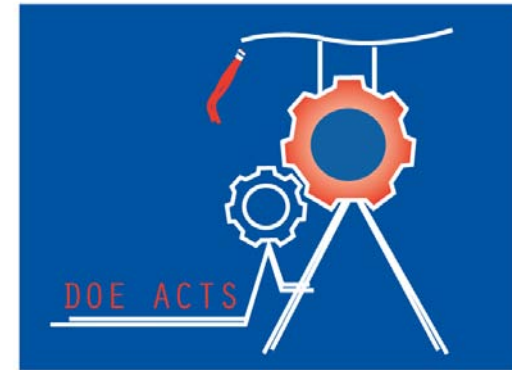


Graduate/Faculty Programs

DOE Academies for Creating
Teacher Scientists



Albert Einstein Fellowship



Faculty and Student Teams





Why should the DOE work with K-12 teachers?



**Teacher as Research
Associate at ORNL**

DOE's National Laboratory system provides a unique environment for science and math teachers to become "teacher scientists" by allowing them to discover the fascination of participating in authentic scientific investigation, so they thus can excite students with both up-to-date knowledge and personal enthusiasm.

The laboratories can play a pivotal role in reforming the nation's STEM education by creating sufficient numbers of highly trained teacher leaders as agents of change in STEM education.

Teachers experience at a lab will enhance their content knowledge and their investigative expertise





Better Science Teachers

- To provide carefully designed mentor-intensive training for science and math teachers that will allow them to more effectively teach; to attract their students' interests to science, mathematics, and technology careers
- DOE is accomplishing this goal through several programs:
 - Albert Einstein Distinguished Educator Program
 - Pre-Service Teacher Program
 - DOE Academies
Creating Teacher Scientists



Teacher as
Research
Associate at
NREL





DOE Academies for Creating Teacher Scientists (DOE ACTS)

- Program was formerly called LSTPD
- K-12 Science, math, and technology teachers
- Community College Faculty
- Long-term commitment to teachers (3 years)
- Utilize best practices of professional development
- Types of programs at the National Labs
 - Teachers as investigators (4 weeks)
 - Teachers as research associates (8 weeks)
- Teachers receive
 - Stipend, housing allowance, travel to lab
 - Funding for mini-grants to purchase equipment and professional development travel





Albert Einstein Distinguished Educator Fellowship

- Fellowship in Washington, D.C. for one year
- Outstanding K-12 science, mathematics, and technology teachers have an academic year fellowship in several Federal agencies
 - Bring their educational expertise and classroom perspective to Capitol Hill, DOE, and other Federal agencies





Faculty and Student Teams (FaST)

- Faculty from institutions that are below the 50th percentile in federal research funding
- Includes faculty from Community Colleges
- Teams are 1 faculty member and up to 3 students
- Partnership with NSF
- FaST has led to research grants to participating colleges





FaST Faculty Grants Submitted & Funded

- ❖ Since the program began (2000), FaST faculty have submitted more than 60 research grant proposals to federal agencies, national laboratories, and other entities (public and private)
- ❖ Examples of funded projects:
 - ❖ Jackson State University (MS) - Use of both two-dimensional gel electrophoresis
 - ❖ Laney Community College (CA) & LBNL - Environmental Control Technology Education for Advanced Building Operation and Management
 - ❖ Southern University (LA) - X ray Detector Lab Development





Legislation Update





Drivers in Sci Ed Policy

- ACI - President Bush
- ACC - Deficit Reduction Act
- Energy Policy Act (EPact) 2005

"This nation must prepare with great urgency to preserve its strategic and economic security... Recommendation A: *Increase America's talent pool by vastly improving K-12 science and mathematics education . . .*"
- *Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, National Academies, 2005





Discussion

What would be the benefits for TCUs?
Can we break down barriers to involvement?






Research Opportunities for Students and Teachers

RESEARCH OPPORTUNITIES FOR STUDENTS AND TEACHERS

TRIBAL COLLEGE SUMMIT

FEBRUARY 23, 2004



The Office of Science supports research opportunities for students and teachers across the country. The Department of Energy's National Laboratories are located in several states.

MULTI-LABORATORY PROGRAMS

Science Undergraduate Laboratory Internship (SULI)
<http://www.science.doe.gov/scied/aul/about.html>
 Contact: Sue Ellen Walbridge (sue-ellen.walbridge@science.doe.gov)

Pre-Service Teacher Program (PST)
<http://www.science.doe.gov/scied/PST/about.htm>
 Contact: Cindy Musick (cindy.musick@science.doe.gov)

Faculty and Student Teams (FaST)
<http://www.science.doe.gov/scied/fst/about.html>
 Contact: Sue Ellen Walbridge (sue-ellen.walbridge@science.doe.gov)

Community College Institute (CCI)
<http://www.science.doe.gov/scied/CCI/about.html>
 Contact: Cindy Musick (cindy.musick@science.doe.gov)

Energy Research Laboratory Equipment Program
<http://etk.oak-ridge.gov/ede/>
 Contact: Sue Ellen Walbridge (sue-ellen.walbridge@science.doe.gov)

Office of Biological and Environmental Research Global Change Education Program
<http://www.atmos.anl.gov/GCEP/>
 Contact: Mill Constantin (constantin@ornl.gov)

SPECIALTY PROGRAMS

Summer Internships in Science and Technology for Minority Students
<http://it-hai.gov/>
 Contact: Elaine Ingram (e Ingram@fai.gov)

Tribal Energy Program Summer Internship
www.science.doe.gov/tribalenergy
 Contact: Sandra Regis-Campbell (sbriggs@sandia.gov)

Teach-The-Teachers Workshop
 Roger Taylor (rogtaylor@ornl.gov)
 Contact: Liana Perez (liana.perez@pdx.doe.gov)

JSNL Fellowships
<http://ofp.lbnl.gov/ofp/debut.html>
 Contact: Rebecca Janody (rebecca.janody@pnl.gov)

Mickey LeRonal Energy Fellowship Program (MLEF)
<http://local.energy.gov/education/lemlfellowship/>
 Contact: Dorothy Fowlkes (Dorothy.Fowlkes@hq.doe.gov)

IDAHO
Provide A Trusting Hand (PATH) Program - Native American Summer Opportunities
<http://www.inel.gov/community/outreach.sh.html>
 Contact: Una Lyng (una@inl.gov)

Office of Science U.S. DEPARTMENT OF ENERGY

INEEL Undergraduate/Graduate Fellowships
<http://education.inel.gov/>
 Contact: Anne Sneed (asneed@inl.gov)

Computer Science Power Fellowship (CSPF)
<http://education.inel.gov/university/cspower.asp>
 Contact: Anne Sneed (asneed@inl.gov)

Training Teachers with INEEL (TTI)
<http://education.inel.gov/peccollege/training-teachers.asp>
 Contact: Jeff Benson (benj@inl.gov)

NEW YORK www.inl.gov/scied

Brookhaven National Laboratory Summer Science Exploration
 Contact: Cindy Biancarosa (biancarosa@bnl.gov)

Community Summer Science Program
 Contact: Mel Morris (mmorris@bnl.gov)

Minority High School Apprentice Program
 Contact: Noel Blackburn (nbc@bnl.gov)

ILLINOIS <http://www.dep.anl.gov/>

Coop Program
 Contact: Frank M. Vivio (fvivio@dep.anl.gov)

Temporary Hire Program
 Contact: Frank M. Vivio (fvivio@dep.anl.gov)

Thesis Parts Program
 Contact: Frank M. Vivio (fvivio@dep.anl.gov)

Laboratory Graduate Thesis Program
 Contact: Frank M. Vivio (fvivio@dep.anl.gov)

Guest Graduate Program
 Contact: Frank M. Vivio (fvivio@dep.anl.gov)

Faculty Research Participation
 Contact: Linda F. Washington (washington@dep.anl.gov)

Faculty Research Leave (Sabbatical Leave)
 Contact: Linda F. Washington (washington@dep.anl.gov)

TENNESSEE

Higher Education Research Experiences at ORNL
<http://www.ornl.gov/hereatornl>
 Contact: Kathy Etkner (ketyner@ornl.gov)

Oak Ridge National Laboratory/Oak Ridge Associated Universities HBCU and MEI Faculty Summer Research Program
<http://www.ornl.gov/orise/edu/ornl/MEI/index.htm>
 Contact: Ruth Keller (rkeller@ornl.gov)

Minority Institutions Biological and Environmental Student Research Participation Program
<http://www.ornl.gov/orise/educ.htm> (click on Grad Students, List by Name, then on the above name of the program)
 Contact: Michael Hubbard (hubbard@ornl.gov)

NEW JERSEY

National Undergraduate Fellowship in Plasma Physics and Fusion Energy Sciences (NUFES)
<http://science-education.ppppl.gov/NUF/index.html>
 Contact: James Morgan (jmorgan@pppl.gov)

Student Opportunities = Green
 Teacher Opportunities = Black
 Student/Teacher Teams = Blue



Office of Science U.S. DEPARTMENT OF ENERGY





What does this mean for TCUs? Competing in WDTs programs

➤ Opportunities

- Undergraduate tribal students might be interested in summer research programs
- Tribal faculty might be interested in FaST
- Information and applications easily accessible on web
- Can participate or sponsor a science bowl

➤ Challenges

- DOE does not have a specific program for TCUs
- No special weight given to students to find spots
- Programs happen at National Labs, so travel may be required, but travel costs will be included





How can you share this info?

www.scied.science.doe.gov

- Recommended that students submit applications before February 1, 2007 for the summer 2007 programs.





Contact Information

www.scied.science.doe.gov

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michelle.rathbun@science.doe.gov

