

**Workforce Development for Teachers and Scientists
Funding Profile by Subprogram and Activity**

(Dollars in Thousands)

	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Internships and Visiting Faculty Activities at the DOE Laboratories			
Science Undergraduate Laboratory Internships	6,340	6,500	7,300
Community College Internships (formerly Community College Institute of Science and Technology)	662	600	700
Visiting Faculty Program (formerly Faculty and Student Teams)	608	1,200	1,300
Fellowships			
Albert Einstein Distinguished Educator Fellowship	1,425	1,200	1,200
DOE Office of Science Graduate Fellowship	8,000	5,000	0
National Science Bowl [®]	3,128	2,700	2,800
Technology Development and On-Line Application Evaluation Studies	200	551	550
Outreach	1,290	300	300
Laboratory Equipment Donation Program	283	300	300
DOE Academies Creating Teacher Scientists	100	149	50
Pre-Service Teachers	180	0	0
High School Engineering	324	0	0
	60	0	0
Total, Workforce Development for Teachers and Scientists	22,600	18,500	14,500

Public Law Authorizations

Public Law 95–91, “Department of Energy Organization Act of 1977”

Public Law 101–510, “DOE Science Education Enhancement Act of 1991”

Public Law 103–382, “The Albert Einstein Distinguished Educator Fellowship Act of 1994”

Public Law 109–58, “Energy Policy Act of 2005”

Public Law 110–69, “America COMPETES Act of 2007”

Public Law 111–358, “America COMPETES Act of 2010”

Overview and Benefits

The Workforce Development for Teachers and Scientists (WDTS) program helps ensure that DOE and the Nation have a sustained pipeline of highly skilled and diverse science, technology, engineering, and mathematics (STEM) workers. This is accomplished through support of

undergraduate internships and visiting faculty programs at the DOE laboratories; the Albert Einstein Distinguished Educator Fellowship for K–12 teachers, which is administered by WDTS for DOE and for a number of other federal agencies; and Nation-wide, middle- and high-school science competitions that culminate annually in the National Science Bowl[®] in Washington D.C.

These investments help develop the next generation of scientists and engineers to support the DOE missions, administer its programs, and conduct the research that will realize the Nation’s science and innovation agenda. Today, DOE’s federal and contractor workforce includes more than 30,000 workers with STEM backgrounds; it is important to ensure the availability and readiness of DOE’s future workforce.

DOE’s 17 national laboratories provide a unique opportunity for STEM workforce development. The

national laboratory system offers access to leading scientists; world-class scientific user facilities and instrumentation; and large-scale, multidisciplinary research programs unavailable in universities or industry. WDTS activities leverage these attributes of the DOE laboratory system to inspire, develop, and train students and educators, with the intent that they continue the pursuit of work relevant to the DOE mission in their future studies and careers.

Program Accomplishments and Milestones

The 2011 National Science Bowl®. In 2011, the number of regional events leading to the finals of the National Science Bowl® increased approximately 5% from the previous year to a total of 110. About 13,000 middle and high school students and 5,000 volunteers participated in the regional and national competitions. Changes and improvements were made in 2011 in response to recommendations from the 2010 WDTS Committee of Visitors: an energy category was added to the questions to increase alignment with DOE missions, and WDTS began efforts to increase the diversity of participants at regional competitions. In 2011, 17 of the regional events were hosted by minority serving professional organizations, including the National Organization of Black Chemists and Chemical Engineers, the Society of Hispanic Professional Engineers, and the American Indian Science and Engineering Society. Regional events were also hosted in Puerto Rico and the U.S. Virgin Islands. In 2012, WDTS will collect regional event participant demographic data using methodologies recognized as being secure and compliant, and use the data to measure minority participation.

Broadening participation in the Office of Science user facilities. The Interdisciplinary Consortium for Research and Educational Access in Science and Engineering (INCREASE) was initiated at Brookhaven National Laboratory with support from the WDTS Faculty and Student Teams activity to promote participation of STEM faculty from Historically Black Colleges and Universities and other minority-serving institutions in research performed at Office of Science user facilities. The activity has since expanded to Lawrence Berkeley National Laboratory and SLAC National Accelerator Laboratory. A primary goal is to establish leaders and role models among these faculty members by allowing them to gain the research and engineering skills required to design

and use advanced instrumentation at the scientific user facilities. Targeted workshops have been held to introduce faculty to the scientific user facilities, particularly the synchrotron radiation light sources and the nanoscale science research centers. These workshops facilitate collaborations with DOE researchers, provide guidance in accessing beam time for research, and encourage full participation in the research of the scientific user facilities. This activity and others will be highlighted at a best-practices workshop sponsored by WDTS to encourage wider participation in the Visiting Faculty Program.

Longitudinal study of participants in the Science Undergraduate Laboratory Internship program. In the first longitudinal study commissioned by WDTS, 3,300 participants from the past 9 years were sent follow-up surveys. Preliminary results indicate that more than 3/4 of the respondents report pursuing STEM careers and about 2/3 of the respondents reported an increased desire to pursue graduate education in STEM as a result of their participation in the program. Additional results will be developed from the survey as part of WDTS program evaluation efforts.

<u>Milestone</u>	<u>Date</u>
The regional competitions of the National Science Bowl are completed.	2nd Qtr, FY 2012
The final competition of the National Science Bowl is completed.	3rd Qtr, FY 2012
WDTS hosts a stakeholders’ meeting to finalize the changes in its activities sited at the DOE Laboratories—the Science Undergraduate Laboratory Internship, the Community College Internship, and the Visiting Faculty Program.	4th Qtr, FY 2012
WDTS hosts a best-practices workshop for the Visiting Faculty Program.	4th Qtr, FY 2012

Explanation of Changes

No funding is requested in FY 2013 for the DOE Office of Science Graduate Fellowship Program.

Program Planning and Management

In FY 2011 and continuing through FY 2013, WDTS program planning and management activities will focus on the short- and long-term recommendations of the

2010 report of the Committee of Visitors. In FY 2011, in response to general recommendations of the Committee of Visitors, senior program staff of WDTS and the Office of the Deputy Director for Science Programs initiated an assessment of WDTS activities, beginning with the activities that are executed at the DOE laboratories—the Science Undergraduate Laboratory Internship (SULI), the Community College Internship (CCI), and the Visiting Faculty Program (VFP). At a meeting with the 17 DOE Laboratory Education Directors the following were discussed for each activity: the activity goal, the activity scope, the metrics of success, and the measurement methodologies. Logic models (formalized descriptions of the connections among the activity inputs, the program itself, the outputs, and the outcomes) were created for each activity. The logic models were then used to create requirements documents for a new IT system software that will track participants from the time of their application through long-term follow up, permitting program assessment and evaluation.

As a part of the response to the recommendation of the 2010 Committee of Visitors for increased interaction and cooperation between WDTS staff and Office of Science research program staff, the Office of Science STEM Working Group was established. The Working Group, which includes Ph.D. level program managers from the SC program offices, coordinates STEM workforce activities across the Office of Science and provides a forum for sharing best practices in program management, particularly management of programs at the DOE laboratories. The STEM Working Group also coordinates with the DOE technology programs.

The Office of Science, in collaboration with the DOE technology programs, represents the Department of Energy on the interagency Committee on STEM Education (CoSTEM) established under the National Science and Technology Council. In response to the 2010 reauthorization of the America COMPETES Act, CoSTEM was formed to coordinate federal STEM education activities and programs and specifically charged to establish and maintain an inventory of federally sponsored STEM education programs and develop a 5-year STEM education strategic plan. As part of these

efforts the federal agencies are identifying and sharing best practices for STEM programs, which will inform processes used by the WDTS programs. In December 2011, CoSTEM released the *Federal Science, Technology, Engineering, and Mathematics (STEM) Education Portfolio*, an inventory and analysis of Federal supported STEM education programs across 13 agencies. Through this committee and other venues, WDTS engages with the National Science Foundation, National Aeronautics and Space Administration, Department of Defense, National Institutes of Health, and other federal agencies to develop interagency efforts in STEM workforce development and education.

WDTS coordinates with other Office of Science and DOE offices in the advancement of their STEM workforce development activities. WDTS participates in the Office of Science STEM Education Working Group and communicates with counterparts in the DOE technology offices on a regular basis.

Program Goals and Funding

Office of Science performance expectations (and therefore funding requests) are focused on four areas:

- *Research*: Support fundamental research to increase our understanding of and enable predictive control of phenomena in the physical and biological sciences.
- *Facility Operations*: Maximize the reliability, dependability, and availability of the Office of Science scientific user facilities.
- *Future Facilities*: Build future and upgrade existing facilities and experimental capabilities to ensure the continuing value of the Office of Science scientific user facilities. All construction projects and MIEs are within 10% of their specified cost and schedule baselines.
- *Scientific Workforce*: Contribute to STEM workforce development through the support of undergraduate internships and visiting faculty programs at the DOE laboratories; a graduate fellowship program; the Albert Einstein Distinguished Educator Fellowship; and the National Science Bowl®.

Goal Areas

Research	Facility Operations	Future Facilities	Scientific Workforce
----------	---------------------	-------------------	----------------------

Workforce Development for Teachers and Scientists 0% 0% 0% 100%

Explanation of Funding and Program Changes

(Dollars in Thousands)

FY 2012 Enacted	FY 2013 Request	FY 2013 vs. FY 2012
-----------------	-----------------	---------------------

Science Undergraduate Laboratory Internships 6,500 7,300 +800

The number of undergraduate students supported increases from approximately 650 to 720.

Community College Internships (formerly Community College Institute of Science and Technology) 600 700 +100

The number of community college students supported decreases from approximately 110 to 80; FY 2012 funding was augmented with prior year funds remaining from terminated activities.

Visiting Faculty Program (formerly Faculty and Student Teams) 1,200 1,300 +100

Funding is increased to help support students participation in the Visiting Faculty Program. Beginning in FY 2012, student participation in this program is optional and participating students, if any, who accompany faculty, are supported through this program rather than through the SULI program.

Albert Einstein Distinguished Educator Fellowship 1,200 1,200 0

No change in funding level. Funding is provided to support 6 Fellows in FY 2013.

DOE Office of Science Graduate Fellowship 5,000 0 -5,000

No funding is provided for this program in FY 2013.

National Science Bowl[®] 2,700 2,800 +100

Funding is increased to help defray increased housing, transportation, and other logistical expenses for the national event.

Technology Development and On-Line Application 551 550 -1

Funding is provided to support the on-line application software development and implementation for all of the WDTS programs.

Evaluation Studies 300 300 0

Funding is provided to accommodate the integration of evaluation and workforce studies into one activity and to support a workshop and/or a review prior to the completion of the evaluation plans for all WDTS activities in FY 2013; this reassessment of evaluation activities addresses comments by the 2010 Committee of Visitors.

Outreach 300 300 0

Funding is provided to engage in cooperative outreach programs with a focus on reaching under-served populations.

Science/Workforce Development for Teachers and Scientists

(Dollars in Thousands)

FY 2012 Enacted	FY 2013 Request	FY 2013 vs. FY 2012
--------------------	--------------------	------------------------

Laboratory Equipment Donation Program

149

50

-99

Funding is reduced because the program includes support for colleges and universities only; the short-term pilot program to include support for middle schools and high schools is not continued.

Total, Workforce Development for Teachers and Students

18,500

14,500

-4,000

Internships and Visiting Faculty Activities at the DOE Laboratories

Overview

Internships and Visiting Faculty Activities at the DOE Laboratories include the Science Undergraduate Laboratory Internships, the Community College Internships, and the Visiting Faculty Program. These activities are located at the DOE laboratories, a system of 17 laboratories unmatched in breadth with capacity for world-class, large-scale, multidisciplinary research and development; leading research facilities; and superb computational capabilities.

The **Science Undergraduate Laboratory Internship (SULI)** program goal is to encourage undergraduate students to enter STEM careers especially relevant to the DOE mission by providing research experiences at DOE national laboratories under the direction of scientific and technical laboratory staff who serve as research advisors and mentors. With its long history, the SULI program places undergraduate students in paid internships in science and engineering research activities at DOE laboratories, working with laboratory staff scientists or engineers on projects related to ongoing research programs. Appointments are for 10 weeks during the summer term or for 16 weeks during the fall and spring terms.

The **Community College Internship (CCI)** program goal is to encourage community college students to pursue technical careers relevant to the DOE mission by providing technical training experiences at DOE laboratories under the direction of laboratory staff who serve as advisors and mentors. The CCI program places students in paid internships in technologies supporting laboratory work under the supervision of a laboratory technician or researcher.

The **Visiting Faculty Program (VFP)** goal is to increase the research competitiveness of faculty members and their students at institutions historically underrepresented in the research community in order to expand the workforce that addresses DOE mission areas. The Visiting Faculty program provides an opportunity for faculty and students from these colleges or universities to contribute to a DOE research project. This program, formerly the Faculty and Student Team program, is being restructured to improve recruitment; improve faculty-laboratory investigator synergy; provide for optional student involvement that does not rely on SULI funding; and increase the use of the Office of Science scientific user facilities. Discussions with the DOE Laboratory Education Directors have provided innovative examples of success that may be incorporated into this WDTS activity.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	SULI supported approximately 610 students.	6,340
	CCI supported approximately 80 students.	662
	VFP supported approximately 75 faculty and their students.	608
2012 Enacted	SULI will support approximately 650 students.	6,500
	CCI will support approximately 110 students.	600
	VFP will continue to support faculty, who have the option of bringing up to two students with them. Beginning in FY 2012 student participation will be optional and participating students, if any, will be supported through this program rather than through the SULI program.	1,200
2013 Request	SULI will support approximately 720 students.	7,300
	CCI will support approximately 80 students.	700
	VFP will increase the total number of faculty and students supported by approximately 3 and 5, respectively.	1,300

Albert Einstein Distinguished Educator Fellowship

Overview

The Albert Einstein Distinguished Educator Fellowship Act of 1994 gives the Department of Energy responsibility for administering a program of fellowships for elementary and secondary school mathematics and science teachers. WDTS manages the Einstein Fellowship for the federal government and encourages participation by other federal agencies. Selected teachers spend eleven months in a Congressional office or a Federal agency. During FY 2011 through FY 2013, DOE supports 6 Fellows; each

year 4–5 are placed in Congressional offices and 2–3 in DOE. Other agencies that have participated include the National Science Foundation, the National Aeronautics and Space Administration, the National Institutes of Health, the Department of Education, the National Institute of Standards and Technology, and the National Oceanic and Atmospheric Administration. The Fellows provide their educational expertise, years of experience, and personal insights to these offices and often are involved in the advancement of science, mathematics, and technology education.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	The FY 2011 appropriation supported 6 Fellows.	1,425
2012 Enacted	The FY 2012 appropriation supports 6 Fellows.	1,200
2013 Request	The FY 2013 WDTS request supports 6 Fellows.	1,200

National Science Bowl®

Overview

The DOE National Science Bowl® is a nationwide academic competition that tests students' knowledge in all areas of science. High school and middle school students are quizzed in a fast-paced, question-and-answer format similar to Jeopardy®.

DOE launched its National Science Bowl® competition in 1991 to encourage high school students who excel in science and math. The National Science Bowl's high school competition today involves more than 13,000 students. DOE introduced the National Science Bowl's competition for middle school students in 2002; it now

involves more than 5,000 students. Since 1991, more than 320,000 students have participated in regional and national competitions.

The number of regional events held annually remains relatively constant, with 67 to 70 high school and 36 to 40 middle school teams participating in the national competition in recent years. Regional science bowl championship teams receive an all-expenses paid trip to Washington D.C. to compete at the national competition in May. Competing teams are composed of four students, one alternate, and a teacher who serves as an advisor and coach.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	WDTS increased the geographic coverage of the regional competitions, especially in high-need areas, in keeping with the recommendations of the 2010 Committee of Visitors.	3,128
2012 Enacted	Funding reflects travel costs for regional winners; increased travel costs for all participants; upgrades to the NSB online registration system to address increased number of participants and out-of-date technologies; and materials and supplies for the 2012 battery-powered electric model car competition that replaces the former hydrogen fuel cell-powered model car competition.	2,700
2013 Request	Funding is increased to help defray increased housing, transportation, and other logistical expenses for the national event.	2,800

Technology Development and On-line Application Systems

Overview

This activity continues modernization of on-line applications systems to enable program-wide IT

architecture integration: an integrated suite of systems to support the on-line application, review, and evaluation for the WDTS programs.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	Funding in FY 2011 supported on-going upgrades of selected on-line applications and surveys that participants complete during their internship/fellowship experiences.	200
2012 Enacted	Funding in FY 2012 supports a redesign to integrate the on-line applications and surveys that participants complete during their internship/fellowship experiences; to bring the transactional web properties into alignment with the programmatic procedures, policies and protocols; and to provide users a facile interface.	551
2013 Request	Funding in FY 2013 continues on-going work.	550

Evaluation Studies

Overview

The Evaluation Studies activity supports work to assess whether WDTs programs meet established goals through the use of collection and analysis of data and other materials, including pre- and post- participation surveys, participant deliverables, and longitudinal participant surveys.

The 2010 Committee of Visitors found little evaluation of activities across WDTs, but noted that the data collection and evaluation plans under development provided some innovative options for gathering work force information and for tracking participants. In FY 2012, the suite of evaluation methodologies is being reassessed with the target of finalizing the evaluation plan for each WDT activity in FY 2013.

Evaluation Studies is aligned with Congressional recommendations in the GPRA Modernization Act of 2010 and the 2008 Congressionally-mandated Academic Competitiveness Council initiative, which emphasized the need for federal programs (including STEM education programs) to demonstrate their effectiveness through rigorous evaluation. WDTs works cooperatively with Office of Science programs, other DOE programs, and other federal agencies through the National Science and Technology Council Committee on STEM Education to share best practices for STEM program evaluation to ensure the implementation of evaluation processes that are appropriate to the nature and scale of the program effort.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	WDTs initiated the first longitudinal survey of past program participants for a subset of WDTs programs.	1,290
2012 Enacted	FY 2012 request initiates assessment of the evaluation plans to measure the effectiveness of investments in STEM workforce development.	300
2013 Request	WDTs finalizes the evaluation plans for all WDTs activities.	300

Outreach

Overview

WDTS engages in cooperative outreach programs with other federal agencies to broaden and enhance its student internship and visiting faculty programs. The activity emphasizes outreach to under-served

populations, with a goal to leverage funding and increase participation of deserving applicants. This activity also explores means to improve the quality of the experience for participants through the recruitment of scientists and engineers to serve as research advisors at host DOE laboratories.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	Funding was provided to engage in cooperative outreach programs with a focus on reaching under-served populations.	283
2012 Enacted	Funding continues the on-going program.	300
2013 Request	Funding continues the on-going program.	300

Laboratory Equipment Donation Program

Overview

The Laboratory Equipment Donation Program provides excess laboratory equipment to faculty at educational institutions for DOE-related research. Through the Energy Asset Disposal System, DOE sites identify excess

equipment. Colleges and universities can then search for equipment of interest to them and apply via the website. DOE property managers approve or disapprove the applications. The equipment is free, but the receiving institution pays for shipping costs.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011 Current	Funding was continued for the on-going program.	100
2012 Enacted	Funding continues the on-going program.	149
2013 Request	Funding continues the on-going program. A reduction in funding reflects the elimination of eligibility for middle schools and high schools based on a suggestion by the 2010 Committee of Visitors.	50

Programs Not Funded in FY 2013

Overview

In FY 2012, three programs—DOE Academies Creating Teacher Scientists, Pre-Service Teachers, and High School Engineering—were terminated due to programmatic considerations and recommendations from the 2010 Committee of Visitors, and Workforce Studies was merged with Evaluation Studies.

In FY 2013, no funds are requested for the DOE Office of Science Graduate Fellowship (SCGF) program. The

program began in FY 2010—80 fellows were fully funded for three years using Recovery Act funds, and 70 were funded for the first of three years with annual appropriations. In FY 2011 and FY 2012, funding continued for the 70 Fellows who were supported with annual appropriations; however, no funding was provided for new cohorts. In FY 2012, prior year funds redirected from terminated activities are used to fully fund a small FY 2012 cohort for three years.

Funding and Activity Schedule

Fiscal Year	Activity	Funding (\$000)
2011	DOE Academies Creating Teacher Scientists	180
Current	Pre-Service Teachers	324
	High School Engineering	60
	Continued the 70 SCGF Fellows in the second year of their Fellowship started with the FY 2010 appropriation.	8,000
2012	Continues the 70 SCGF Fellows in the third year of their Fellowship started with the FY 2010 appropriation. Prior year funds are used to fully fund a small FY 2012 cohort, totaling approximately 50 fellows, for three years.	5,000
Enacted		
2013	None of these activities is funded in FY 2013.	0
Request		

Supporting Information

Operating Expenses, Capital Equipment and Construction Summary

(Dollars in Thousands)

	FY 2011 Current	FY 2012 Enacted	FY 2013 Request
Operating Expenses	22,600	18,500	14,500