Workforce Development for Teachers and Scientists

Overview

The Workforce Development for Teachers and Scientists (WDTS) program mission is to help ensure that DOE has a sustained pipeline of science, technology, engineering, and mathematics (STEM) workers. This is accomplished through support of undergraduate internships, graduate thesis research, and visiting faculty programs at the DOE laboratories; the Albert Einstein Distinguished Educator Fellowship for K–12 STEM teachers, administered by WDTS for DOE and for a number of other federal agencies; and annual, nationwide, middle- and high-school science competitions culminating in the National Science Bowl® in Washington, D.C. These investments help develop the next generation of scientists and engineers to support the DOE mission, administer programs, and conduct research.

WDTS activities rely significantly on DOE's 17 laboratories, which employ more than 30,000 workers with STEM backgrounds. The DOE laboratory system provides access to leading scientists; world-class scientific user facilities and instrumentation; and large-scale, multidisciplinary research programs unavailable in universities or industry. WDTS leverages these assets to develop and train post-secondary students and educators in support of the DOE mission.

Highlights of the FY 2016 Budget Request

The FY 2016 Request maintains support levels of workforce programs conducted at DOE Laboratories. These experience-based STEM learning opportunity programs enable highly qualified applicants to conduct research at the DOE laboratories, in support of the workforce mission.

Description

Activities at the DOE Laboratories

WDTS supports activities such as the Science Undergraduate Laboratory Internships program, the Community College Internships program, the Office of Science (SC) Graduate Student Research Program, and the Visiting Faculty Program. A goal of these programs is to encourage students to enter STEM careers especially relevant to the DOE mission. By providing research experiences at DOE laboratories under the direction of scientific and technical laboratory staff who serve as research advisors and mentors, these activities provide opportunities for participants to engage in research requiring specialized instrumentation; large-scale, multidisciplinary efforts; and/or scientific user facilities. WDTS activities are aligned with the strategic objectives of the National Science and Technology Council Committee on STEM Education (CoSTEM) Federal STEM Education 5-Year Strategic Plan.[a]

The **Science Undergraduate Laboratory Internships (SULI)** program places students from 2 and 4 year undergraduate institutions as paid interns in science and engineering research activities at DOE laboratories, working with laboratory staff scientists and engineers on projects related to ongoing research programs. Appointments are for 10 weeks during the summer term and 16 weeks during the fall and spring terms. In 2015, General Atomics in San Diego, California, home to DIII-D, the largest magnetic fusion facility in the U.S. and operated as an Office of Science national user facility, will be an additional summer term host institution.

The **Community College Internships (CCI)** program places community college students as paid interns in technological activities at DOE laboratories, working under the supervision of a laboratory technician or researcher. Appointments are for 10 weeks during the summer term and 16 weeks during the planned fall and spring terms.

The **Office of Science Graduate Student Research (SCGSR)** program goal is to prepare graduate students for STEM careers critically important to the SC mission by providing graduate thesis research opportunities at DOE laboratories. The SCGSR program provides supplemental awards for graduate students to pursue part of their graduate thesis research at a DOE laboratory in areas that address scientific challenges central to the SC mission. U.S. graduate students pursuing Ph.D. degrees in physics, chemistry, materials sciences, non-medical biology, mathematics, computer or computational sciences, or specific areas of environmental sciences aligned with the SC mission are eligible for research awards to conduct part of

[a] http://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf

their graduate thesis research at a DOE laboratory in collaboration with a DOE laboratory scientist. Research award terms range from three months to one year.

The **Visiting Faculty Program (VFP)** goal is to increase the research competitiveness of faculty members and students at institutions of higher education historically underrepresented in the research community in order to expand the workforce that addresses DOE mission areas. Through direct collaboration with research staff at DOE host laboratories, VFP appointments provide an opportunity for faculty and their students to develop skills applicable to programs at their home institutions; this helps increase the STEM workforce in DOE science mission areas at institutions historically under-represented within the DOE enterprise. Appointments are in the summer term for 10 weeks.

Albert Einstein Distinguished Educator Fellowship

The Albert Einstein Distinguished Educator Fellowship Act of 1994 charges the Department of Energy (DOE) with administering a fellowship program for elementary and secondary school mathematics and science teachers that focuses on bringing teachers' real-world expertise to government to help inform federal STEM education goals and programs. Selected teachers spend eleven months in a Federal agency or a Congressional office. WDTS manages the Albert Einstein Distinguished Educator Fellowship (AEF) Program for the Federal government. Fellows are supported by DOE and other Federal agencies. Typically, SC supports six Fellows each year; four are placed in Congressional offices and two are placed in SC. Participating agencies have included the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and the National Oceanic and Atmospheric Administration (NOAA), as well as other DOE offices. The Fellows provide educational expertise, years of teaching experience, and personal insights to these offices to advance science, mathematics, and technology education programs.

National Science Bowl®

The DOE SC National Science Bowl® (NSB) is a nationwide academic competition testing students' knowledge in all areas of mathematics and science, including energy. High school and middle school students are quizzed in a fast-paced, question-and-answer format. Since 1991, more than 240,000 students have participated in regional and national competitions.

The National Science Bowl® regional winning teams receive all-expenses paid trips to Washington D.C. to compete at the National Finals in late April. Competing teams are composed of four students, one alternate, and a teacher who serves as an advisor and coach. SC manages the National Science Bowl®, provides central management of 116 regional events, and sponsors the NSB Finals competition.

In FY 2014, 5,200 middle school students from 736 schools and 9,300 high school students from 1,351 schools participated in the regional competitions, with 48 middle school and 68 high school teams (560 students) participating in the National Finals in Washington, D.C. More than 5,000 volunteers also participated in the local and national competitions. In FY 2014, for the first time, students from all 50 states, U.S. Virgin Islands, Puerto Rico, and Washington, D.C. participated in a regional event of the National Science Bowl®. Beginning in FY 2015, the National Science Bowl®championship finals are planned to be held at the Lisner Auditorium (located on the campus of The George Washington University) with a live web-streaming broadcast of this event.

The DOE National Science Bowl® is aligned with the CoSTEM Federal STEM Education 5-Year Strategic Plan priority investment area for STEM engagement.

Technology Development and On-Line Application

This activity modernizes on-line systems used to manage applications and review, data collection, and evaluation for WDTS programs. A project to develop, build, and launch new online application and program support systems is progressing to improve program management, execution, and evaluation by WDTS program staff and by DOE laboratory staff. An important component of the systems is the ability to support regular evidence-based evaluation of program performance and impact. A phased approach is being used to develop and build the systems. In FY 2014, systems for the Albert Einstein Distinguished Educator Fellowship, the Office of Science Graduate Student Research Program, and National Science Bowl® were developed and launched, with recurring administrative tool development and system updates scheduled to begin in FY 2015.

Evaluation Studies

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 questionnaires, participant deliverables, notable outcomes (publications, presentations, patents, etc.), and longitudinal participant tracking.

Prior Committee of Visitors reviews found little evaluation of activities across WDTS but noted that the data collection and evaluation plans under development provided innovative options for gathering workforce information and for tracking participants. In FY 2014, evaluation plans for each WDTS activity were completed. Enhanced data analysis efforts initiated in FY 2014 will continue throughout FY 2015, and beyond.

SC completed a study to identify disciplines in which significantly greater emphasis in workforce training at the graduate student or postdoc levels is necessary to address gaps in current and future Office of Science mission needs. In this study, each Office of Science Federal Advisory Committee, each Associate Director, and each Laboratory Director were asked for their expert assessment on the following: (i) STEM disciplines not well represented in academic curricula; (ii) STEM disciplines in high demand, nationally and/or internationally, resulting in difficulties in recruitment and retention at U.S. universities and at DOE laboratories; (iii) STEM disciplines for which the DOE laboratories may play a role in providing needed workforce development; and (iv) recommendations for programs at the graduate student or postdoc levels that can address discipline-specific workforce development needs. The outcomes of this study will guide prioritization of eligible SCGSR programmatic research areas and inform WDTS strategic planning. More broadly, the outcomes of this study have identified for SC both program-specific workforce development needs and crosscutting workforce development needs in areas such as computing and computational sciences.

Evaluation Studies is aligned with the GPRA Modernization Act of 2010, the President's management priorities,[a] 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 evidence-based evaluation. WDTS works cooperatively with SC programs, other DOE programs, and other federal agencies through CoSTEM to share best practices for STEM program evaluation to ensure the implementation of evaluation processes appropriate to the nature and scale of the program effort.

Outreach

WDTS engages in outreach activities, some in cooperation with other DOE program offices and select federal agencies, to widely publicize opportunities for student internships, SC Graduate Student Research program, the Visiting Faculty Program, and the Albert Einstein Distinguished Educator Program. The WDTS website[b] is the most widely used tool for prospective program participants to obtain information about WDTS and is the gateway to accessing the online applications for the WDTS programs. To help diversify the applicant pool, outreach is conducted via presentations to targeted key stakeholder groups, and via the web using webinar virtual meetings that highlight the programs, their opportunities, and the WDTS internship experience. A portfolio of recorded webinars is available on the WDTS website.

Laboratory Equipment Donation Program

The Laboratory Equipment Donation Program provides excess laboratory equipment to faculty at non-profit research institutions and post-secondary educational institutions. Through the Energy Asset Disposal System, DOE sites identify excess equipment and colleges and universities can then search for equipment of interest and apply via the website. The equipment is free, but the receiving institution pays for shipping costs.

[a] http://www.whitehouse.gov/administration/eop/ostp/nstc/committees/costem
[b] http://science.energy.gov/wdts/

Workforce Development for Teachers and Scientists
Funding ($K)

	FY 2014 Enacted	FY 2014 Current	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Activities at the DOE Laboratories					
Science Undergraduate Laboratory Internships	7,800	7,800	8,300	9,000	+700
Community College Internships	700	700	1,000	1,200	+200
Graduate Student Research Program (formerly Office of Science Graduate Fellowship)	10,700	10,700	2,500	2,500	0
Visiting Faculty Program	1,300	1,300	1,700	1,800	+100
Total, Activities at the DOE Laboratories	**20,500**	**20,500**	**13,500**	**14,500**	**+1,000**
Albert Einstein Distinguished Educator Fellowship	**1,200**	**1,200**	**1,200**	**1,200**	0
National Science Bowl®	**2,800**	**2,800**	**2,900**	**2,900**	0
Technology Development and On-Line Application	**550**	**550**	**750**	**750**	0
Evaluation Studies	**600**	**600**	**600**	**600**	0
Outreach	**800**	**800**	**500**	**500**	0
Laboratory Equipment Donation Program	**50**	**50**	**50**	**50**	0
Total, Workforce Development for Teachers and Scientists	**26,500**	**26,500**	**19,500**	**20,500**	**+1,000**

Program Accomplishments

Science Undergraduate Laboratory Internships (SULI) - In FY 2014, the total number of participating DOE host laboratories increased (from 15 to 16), as did the number of DOE host laboratories (from 11 to 12) participating in the semester terms. This increased participation, largely due to the quality and impact of the program, serves to broaden participant STEM sub-field experience-based training opportunities and enhance their overlap with DOE mission-critical research areas.

Community College Internships (CCI) – In FY 2014, the portfolio of experiential-based learning opportunity sub-fields increased to include combustion science and technologies.

Office of Science Graduate Research (SCGSR) – The SCGSR Program supported 65 supplemental awards to graduate students to conduct their thesis research at 15 DOE national laboratories. Over half of the awards support project terms ranging from 10-12 months.

Visiting Faculty Program (VFP) - A VFP faculty participant from Howard University is now a collaborator on the PHENIX experiment (for Pioneering High Energy Nuclear Interaction eXperiment) at the Relativistic Heavy Ion Collider (RHIC) user facility (Brookhaven National Laboratory). Howard University is the only HBCU (Historically Black Colleges and Universities) member on the PHENIX collaboration.

The ***National Science Bowl®*** - In FY 2014, for the first time, students from all 50 states, U.S. Virgin Islands, Puerto Rico, and Washington, D.C. participated in a regional event of the National Science Bowl®.

Technology Development and On-Line Application - In FY 2014, new application and review systems for the Albert Einstein Distinguished Educator Fellowship, the Office of Science Graduate Student Research Program, and National Science Bowl® were developed and launched.

Activities and Explanation of Changes

FY 2015 Enacted	FY 2016 Request	Explanation of Changes FY 2016 vs FY 2015
Activities at the DOE Laboratories $13,500,000	**$14,500,000**	**$+1,000,000**
Science Undergraduate Laboratory Internships ($8,300,000) SULI supports approximately 760 students, including an additional 35 fall and spring semester students. In 2015, General Atomics in San Diego, California, home to DIII-D, the largest magnetic fusion facility in the U.S. and operated as an SC user facility, will be an additional summer term host institution, to help fulfill workforce needs formerly addressed by the National Undergraduate Fellowship Program (NUF). Additional SULI placements will be made at the Princeton Plasma Physics Laboratory as the NUF program, funded within the Fusion Energy Sciences program, completes its merger with SULI.	*Science Undergraduate Laboratory Internships ($9,000,000)* SULI will support approximately 820 students, including support for an additional 45 fall and spring semester students.	*Science Undergraduate Laboratory Internships ($+700,000)* Funding supports additional students internships at the DOE laboratories
Community College Internships ($1,000,000) CCI supports approximately 90 students.	*Community College Internships ($1,200,000)* CCI will support approximately 100 students.	*Community College Internships ($+200,000)* Funding supports additional student internships at the DOE laboratories.
Graduate Student Research Program ($2,500,000) The SCGSR program supports approximately 100 graduate students for periods of 3 months to 1 year to conduct a part of their thesis research at DOE laboratories.	*Graduate Student Research Program ($2,500,000)* The SCGSR program will support approximately 100 graduate students for periods of 3 months to 1 year to conduct a part of their thesis research at DOE laboratories. Targeted priority research areas will be informed by SC's recent workforce training needs study.	*Graduate Student Research Program ($0)* No change.

FY 2015 Enacted	FY 2016 Request	Explanation of Changes FY 2016 vs FY 2015
Visiting Faculty Program ($1,700,000) VFP supports approximately 65 faculty and 30 students.	*Visiting Faculty Program ($1,800,000)* VFP will support approximately 70 faculty and 35 students.	*Visiting Faculty Program ($+100,000)* Funding supports additional faculty and student opportunities at the DOE laboratories.
Albert Einstein Distinguished Educator Fellowship $1,200,000 The FY 2015 request supports 6 Fellows.	**$1,200,000** The FY 2016 request will support 6 Fellows.	**$0** No change.
National Science Bowl® $2,900,000 WDTS sponsors the finals competition and provides central management of 116 regional events, involving 14,500 students from all fifty states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. National Finals: April 23-27, 2015.	**$2,900,000** WDTS will sponsor the finals competition and provides central management of 116 regional events, involving 14,500 students from all fifty states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands.	**$0** No change.
Technology Development and On-line Application Systems $750,000 Funding in FY 2015 completes the design, build, and implementation of online management systems for the SCGSR, including the participant deliverables and evaluation components, and the National Science Bowl®. Funding also provides increased capacity for collecting data in support of evaluation studies.	**$750,000** Funding will continue development and operation of the on-line systems.	**$0** No change.
Evaluation Studies $600,000 FY 2015 funding supports enhanced evaluation efforts initiated in FY 2014, and the implementation of an evaluation plan for the SCGSR, including data archiving, curation, and analyses.	**$600,000** FY 2016 funding will continue support for evaluation activities, including data archiving, curation, and analyses.	**$0** No change.

FY 2015 Enacted	FY 2016 Request	Explanation of Changes FY 2016 vs FY 2015
Outreach $500,000	**$500,000**	**$0**
Funding supports development and deployment of a public web portal to track the inventory of STEM workforce internship and outreach activities and opportunities across the DOE laboratory complex. Enhanced outreach activities to the scientific community aimed at assessing the Office of Science mission-driven disciplinary workforce needs in the next 5 to 10 years are initiated.	Funding will support a public web portal to track the inventory of STEM workforce internship and outreach activities and opportunities across the DOE laboratory complex. Funding will support outreach activities to the scientific community targeting Office of Science mission-driven disciplinary workforce needs in the next 5 to 10 years.	No change.
Laboratory Equipment Donation Program $50,000	**$50,000**	**$0**
Funding continues to support the administration of the ongoing program.	Funding will continue the ongoing program.	No change.