

**Graduate Student Research Opportunities
at
United States Department of Energy National Laboratories**

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Abstract

The United States Department of Energy (DOE) National Laboratory Facilities offer multiple opportunities for graduate students to participate in ongoing research efforts. Programs involve students at all phases of their academic careers, including potential graduate students who participate at the facilities while undergraduates. The graduate students often have opportunities to conduct research for extended periods using the unique facilities not normally available on campuses. The overall purposes of involving such students are to provide access to research that is not available elsewhere and to encourage young talented students to continue their research careers focussed on areas of interest to the Department of Energy. The programs offered by Argonne National Laboratory, a major DOE research facility, are presented and include appointments for students from U.S. higher education institutions as well as opportunities for students from foreign countries who are currently in graduate school. Such students typically complete all or part of their thesis in collaboration with Argonne scientists and engineers along with professors from their universities.

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Introduction

The United States Department of Energy (DOE) supports scientific research conducted at national laboratories throughout the nation. As a part of the federal government that is a major source of support of graduate students in science and engineering, these facilities offer unique opportunities to college and university faculty and students from the undergraduate through faculty levels. A primary activity in all such facilities is to involve graduate students in the research through traineeships and research assignments. The particular programs at Argonne National Laboratory are provided as an examples of such opportunities at a major DOE national laboratory

DOE Laboratory Complex

The following are the major multi-program laboratories that are a part of the DOE complex:

Laboratory	Location
Argonne National Laboratory	Chicago, IL
Brookhaven National Laboratory	Upton, NY
Idaho National Engineering Laboratory	Idaho Falls, ID
Lawrence Berkeley National Laboratory	Berkeley, CA
Lawrence Livermore National Laboratory	Livermore, CA
Los Alamos National Laboratory	Los Alamos, NM
Oak Ridge National Laboratory	Oak Ridge, TN
Pacific Northwest National Laboratory	Richland, WA
Sandia National Laboratory	NM and CA

In addition, the following are the program dedicated laboratories of the Department of Energy.

Laboratory	Location
Ames Laboratory	Ames, IA
Federal Energy Technology Center	PA and WV
Fermi National Accelerator Laboratory	Batavia, IL
National Renewable Energy Laboratory	Golden, CO
Oak Ridge Institute for Science & Education	Oak Ridge, TN
Princeton Plasma Physics Laboratory	Princeton, NJ
Stanford Linear Accelerator Laboratory	Palo Alto, CA
Thomas Jefferson National Accelerator Facility	Newport News, VA

Overall Education and Training Missions

Education and training is a part of the DOE mission at its facilities. For example, the following are the mission statements in this area for Argonne National Laboratory.

1. Promote organized access to facilities to contribute to research and development efforts.
2. Contribute to fulfilling the nation's manpower needs in science, technology and areas of DOE interest.
3. Encourage students to pursue careers in energy related fields.

The Graduate Student Programs at Argonne National Laboratory

The following are the programs that involve graduate students in scientific research and practicum experiences.

Laboratory-Graduate Research (Lab-Grad) appointments are available for qualified U.S. university graduate students who wish to carry out their thesis research at Argonne National Laboratory under the co-sponsorship of an Argonne staff member and a faculty member at the student's home institution. The university sets the academic standards and awards the degree. In practice, participation by the faculty member varies from full partnership in the research to general supervision of the student's thesis work. The Argonne staff sponsor undertakes to keep the faculty sponsor informed about the student's progress, and he/she attends the thesis defense. Research may be conducted in the basic physical and life sciences, mathematics, computer science, and engineering as well as in a variety of applied areas relating to conservation, environment, fission and fusion energy, and other energy technologies. Lab-Grad appointments are for a one-year term with annual renewals being contingent upon satisfactory performance by the appointee. Appointments usually commence when the student begins full-time thesis research at Argonne after having completed all other academic requirements. In certain cases, students may be awarded support for pre-thesis studies on campus, provided that they intend to carry out their thesis research at Argonne. Support of a Lab-Grad appointee consists of a stipend, tuition payment up to \$5,000 per year, and certain travel expenses. In addition, the student's faculty sponsor may receive payment for limited travel expenses. In cases where the student's annual tuition cost exceeds \$5,000 per year, the university is expected to provide additional financial assistance to the student as required. An application for a Lab-Grad appointment may be submitted at any time during the year and an appointment may commence at any time. To be eligible for a Lab-Grad Appointment, a student must be a U.S. citizen or permanent resident alien. A completed application should be submitted at least one month prior to any proposed starting date but earlier application submission is advantageous because the availability of Lab-Grad appointments is limited by funding constraints. Mutual interest in an area of research by the student and the Argonne staff sponsor is essential for the successful arrangement of a Lab-Grad appointment. To help the parties gauge their mutual interest, a limited number of temporary appointments are available for qualified graduate students so that they may work with an Argonne staff member and become familiar with his/her research program. These temporary appointments have a tenure of three months and support consists of a per diem payment to help defray the cost of living away from home, plus travel expenses.

Thesis-Parts Appointments support qualified graduate students who wish to visit Argonne for periods from a few days to a few months, so that they may utilize special Laboratory facilities.

Financial support, consisting of a per diem payment, may be provided to help defray the cost of traveling to Argonne. Application is typically made through an Argonne staff person or research division appropriate to the proposed activity.

Guest Graduate Appointments are available for qualified graduate students who show that access to Argonne National Laboratory will be beneficial to their thesis research and to Argonne programs. A Guest Graduate is provided a gate pass, usually for one year, and the student may visit Argonne whenever appropriate. A Guest Graduate receives no stipend or payment of any kind from the Laboratory.

A unique graduate student program is the Nonproliferation Graduate Program which provides professional training and experience for future leaders in nonproliferation. This graduate-level internship and practicum program is designed for students conversationally fluent in Russian and/or Ukrainian interested in nuclear nonproliferation activities. Interns selected for the Program are either first- or second-year graduate students with a career interest in International Affairs, Foreign Affairs, Political Science, Economics, International Business, or related programs, who may have lived, worked, or studied overseas, preferably in Russia and the Newly Independent States (NIS).

The Program is divided into an internship (training phase) in Washington, D.C., and/or the DOE National Laboratories and a foreign practicum (practical application phase), a one-year overseas assignment where students apply their training and language skills to ongoing DOE nonproliferation programs.

The foreign practicum provides unique opportunities for students to assist in implementing DOE-sponsored bilateral programs with a variety of organizations in Russia and the NIS by providing an on-ground presence in these host countries. Students play an important role in supporting ongoing nonproliferation efforts.

The Future

Graduate students have been involved with research at the DOE National Laboratories for over half a century. This mutually beneficial relationship can be strengthened through promoting research partnerships that involve the full extent of collaboration with the research work being conducted by graduate students as the catalyst for this development. In addition, colleges and universities can promote graduate education opportunities to undergraduates who have the desire to continue their education. Although programs are primarily designed for students from colleges and universities in the United States, students from other countries can conduct their thesis research with National Laboratory scientists and engineers. This type of collaboration reinforces the international nature of scientific inquiry and provides a vehicle for current and future joint research efforts.

Overall, the collaboration between the academic and DOE National Laboratory community is strengthened through the involvement of graduate students performing research at the DOE facilities.