

Supporting Graduate Students: A Catalog of Opportunities

Audeen W. Fentiman
The Ohio State University

Introduction

Finding support for graduate students in Nuclear Engineering can be a challenge. Many students are supported as Graduate Research Associates (GRA) on faculty projects, and some serve as Graduate Teaching Associates (GTA) helping to teach undergraduate nuclear engineering courses. As enrollments in Nuclear Engineering programs grow, the number of promising students can exceed the number of traditional GRA and GTA positions available. There are, however, a number of other alternatives to the standard funding mechanisms for graduate students. These include GRA and GTA positions in other departments, scholarships and fellowships, internships, funding from organizations focused on increasing diversity, and funding through international agencies. Specific examples of each are provided in the remaining sections of this paper.

Research and Teaching Associateships with Other Departments

Nuclear Engineering is a very broad field. It involves the application of equipment and techniques developed in other fields, and many other disciplines benefit from the application of nuclear science and technology. There have always been some collaborative efforts between nuclear engineering faculty and those from other disciplines. Recently, the Department of Energy has funded several INIE (Innovations in Nuclear Infrastructure and Education) consortia with one primary goal being to increase utilization of university research reactors. Members of the consortia are encouraged to collaborate with faculty in other disciplines at their own university and with faculty from other universities in the region. While faculty from these other disciplines will generally want to fund their own students, in some cases, they do not have students with the necessary expertise and need a nuclear engineering student. Departments where nuclear engineers may find potential collaborators include agriculture, food science, environmental science, medicine, veterinary medicine, biology, geology, astronomy, physics, and chemistry, not to mention a variety of other engineering disciplines.

Nuclear Engineering programs at some universities offer only graduate degrees. Students in their programs typically have a number of different undergraduate degrees. Examples are mechanical, electrical, chemical, or materials engineering, physics, mathematics, and sometimes chemistry. These students can serve as teaching associates for the discipline in which they have their undergraduate degree. Almost all engineering students are in a position to serve as GTAs in mathematics or beginning physics or computer science courses. While those departments generally like to hire their own graduate students to serve as GTAs, they sometimes offer a large number of undergraduate service courses and need additional help. Nuclear Engineering

students who approach these departments, particularly at a time other than fall quarter, can sometimes find support. Another type of course that is becoming more common at large engineering schools is a freshman introductory engineering course, and GTAs are commonly employed to work with the beginning students. Nuclear engineering graduate students are as qualified to work with the freshmen as any other engineering graduate student.

Another place nuclear engineering students may find teaching associateships is with programs where science, math, and engineering students are employed to assist K-12 teachers. The National Science Foundation sponsors a K-12 Teaching Fellows program and a variety of other projects in which science students serve as resource persons in public school classrooms. The goals of these programs are to improve K-12 science and math education and increase the number of students both interested in and prepared to pursue a college degree in science, technology, engineering, or mathematics (STEM). Many large corporations, such as General Electric, and non-profit foundations also fund programs to encourage students, particularly those in underrepresented groups, to select STEM majors. Graduate students in engineering are particularly well suited to work on these types of programs since the programs often focus on hands-on activities that help students understand mathematical and scientific concepts.

While working as a teaching associate with college freshmen or students in K-12 does not provide a nuclear engineering student with an opportunity to do technical research, it can provide some valuable insights for the graduate student. It can also benefit the nuclear industry. Many people, including teachers and students, are not familiar with the fundamentals of radiation science, nor are they familiar with the many applications of nuclear science and technology. A nuclear engineering student serving as a teaching associate or resource person in K-12 or undergraduate engineering courses can provide solid information and educational materials on nuclear science and technology. He or she may even inspire some of the students to choose that field of study. At the same time, the nuclear engineering student can benefit from spending time with people who do not automatically accept nuclear science and technology as being beneficial. Learning how the general public thinks about radiation, nuclear power, nuclear waste, etc. prepares a nuclear engineer for dealing with the public in his or her professional career – a skill that many nuclear engineers have lacked in the past.

Scholarships and Fellowships

Scholarships and fellowships are available from a variety of sources and can vary from a few hundred dollars per year to full tuition and a generous stipend. They are offered by universities, professional organizations, non-profit foundations, government agencies, and industries. Some are specifically for nuclear engineers or students in related fields. Some are offered to students in any technical field, while others are available to any graduate student. Nuclear Engineering faculty members are aware of full-ride fellowships offered by their universities. However, there are often other, less publicized local or regional awards available. For example, alumni of the university sometimes establish scholarship funds for a person from a particular county or companies provide scholarship money for children of their employees. In addition, Nuclear Engineering programs can build alumni scholarship funds to help support students.

Professional organizations such as the American Nuclear Society provide scholarships, as do industry consortia such as the Institute for Nuclear Power Operations. Nuclear utilities and other employers of nuclear engineers will occasionally provide support to an employee pursuing a graduate degree.

Federal agencies are sources of several highly competitive fellowships. These agencies include the Department of Energy (nuclear engineering and health physics fellowships), Office of Civilian Radioactive Waste Management, Nuclear Regulatory Commission, National Science Foundation, National Institutes of Health, Environmental Protection Agency, and others. State agencies generally are not in a position to offer fellowships. However, state agencies often are willing to provide tuition reimbursement and time to attend classes for employees who are pursuing a graduate degree. The various branches of the armed forces also provide support for some of their officers to pursue advanced degrees in nuclear engineering on a full-time basis.

Internships

While faculty members generally prefer that their graduate students contribute to their research programs on campus, funding for those programs is sometimes limited. Internships with industry, government agencies, or national laboratories can provide a student with an opportunity to conduct a research project. In many cases, the faculty advisor can have some involvement in the research, and the “shared” graduate student can be a catalyst for collaboration between the university and the organization funding the intern’s position.

Most large companies related to the nuclear industry have some intern positions available. They like to keep a constant stream of interns in their laboratories and typically prefer to hire graduates who have experience with the company as an intern. The Nuclear Energy Institute maintains a list of companies with intern positions available, and most large utilities hire several interns each year.

National laboratories hire many interns; they are particularly interested in Ph.D. students. Internships are also available at federal and state agencies. The NRC and EPA are two national agencies that hire interns, both at national headquarters and at regional offices. State environmental protection agencies and the state agencies responsible for enforcing radiation protection regulations generally have internship positions. In recent years, state offices of emergency management have also begun to hire students with expertise in nuclear engineering or radiation protection as interns. Many of the state agency positions are for summer only. However, it is sometimes possible for a university to negotiate a continuing intern position to be filled by a graduate student. And international organizations such as the IAEA should not be overlooked as potential sources of internships.

Funding from Agencies Seeking to Promote Specific Agendas

Some organizations want to provide funding for graduate students who will help them to meet the organization’s goals. For example, the American Association of University Women and the Society of Women Engineers provide funding for women attending graduate school. The American Nuclear Society has a scholarship for women who have been out of the workforce and

are attending school in preparation for resuming their careers. GEM provides scholarships for minority students in science and engineering. Broader programs, such as the Louis Stokes Program, which is funded by the National Science Foundation, were established to increase the number of minority students receiving college degrees. While such funds might not be designed specifically for nuclear engineering students, they certainly can support students in that discipline. The World Bank funds some international students who study in the United States to gain technical expertise and then return to their home countries to apply that knowledge. Foreign governments or foreign companies are sometimes willing to pay for a students' education in the United States. Again, these opportunities are not specifically for nuclear engineers, but nuclear engineering students can take advantage of them.

Summary

While interest in nuclear engineering and the number of nuclear engineering graduate students may be increasing, there is no assurance that the amount of funding available to support those students from traditional pools will keep pace with the increased demand. There are, however, many other sources of funding to be considered. Some of them provide students with an opportunity to conduct research in nuclear engineering and some of them do not, but all of them can make it possible for a student to complete his or her education in nuclear engineering

AUDEEN W. FENTIMAN is Chair of the Nuclear Engineering Graduate Program at The Ohio State University. She has also served as Director of the interdisciplinary Environmental Science Graduate Program and as Associate Dean of Engineering at Ohio State.