



WASHINGTON UNIVERSITY MCKELVEY SCHOOL OF ENGINEERING
STRATEGIC PLAN TO ACHIEVE LEADERSHIP THROUGH EXCELLENCE

EDUCATION

Recruiting & Supporting PhD Students



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Executive Summary

The ability to attract top-notch PhD students, ensure adequate support and training, and achieve excellent placement has a huge impact in our school's future as a leader in research and innovation and the reputation across the world. The school sees many opportunities for strategic improvement in recruitment, support, and placement. **The proposed initiative will seek to re-engineer our PhD program to attract more and higher-quality students, provide them with better support and training, and help them seize better career opportunities.** As a concrete illustration, a coherent strategy should be developed to support the level of recruiting effort that is commensurate to the growth of each department. Degree programs should be facile and cut across departmental boundaries to encourage the growth of research activities at the interfaces of departments. The development of training programs focused on non-technical skills (e.g., communication, ethics, social skills) and the support of career development programs will significantly raise our ability to achieve excellence and secure leadership.

The proposed initiative will require the initiation of a consolidated recruiting effort with dedicated resources and staffing at the school level. Efforts should be expended to attract our own students (particularly undergraduates), international candidates from our university's partner institutions, and candidates who come from diverse socio-economic and cultural backgrounds. A general framework is needed for creating interdisciplinary PhD degree programs that cut across boundaries between departments and even schools.

Recruiting and supporting PhD students

The School of Engineering & Applied Science (SEAS) strives to not only attract the best and brightest PhD students but also to help them to succeed in the best possible way. We see several strategic opportunities that span the lifecycle of a PhD student, including transformation of PhD recruitment, creation of interdisciplinary degrees, and restructuring of PhD programming for better training and support.

1. Transforming PhD Recruitment

Attracting top-notch students into our PhD program is essential to achieve excellence in research. PhD students are the ultimate producers of research output. A large cohort of capable PhD students is the key to increasing research productivity, attracting and retaining outstanding faculty, and propelling the long-term growth of the school.

We see significant opportunities in improving the quantity, quality, and diversity of our PhD cohort through strategic re-thinking of the recruitment process. First, recruiting is handled by individual departments and faculty. However, a single department or faculty member does not have the time or money to reach out to a broad base of universities or candidates, particularly when it comes to recruiting international students, and there is duplication of efforts between faculty and departments. Second, we are not taking full advantage of undergraduate students enrolled in our school. Many of our top undergraduates go onto successful research careers in other institutions. Third, few school-level fellowships exist to attract exceptional candidates, and the application process for university-level scholarships and fellowships can be further streamlined. Fourth, there is currently no structured outreach or recruiting effort targeting under-represented minorities.

SEAS will invest in the following efforts to address the above-mentioned opportunities:

- **Recruiting at the school level.** A consolidated recruiting effort at the School level will allow us to utilize the School's greater resource to reach out to a larger community, minimize effort duplication, and further leverage the brand of the Engineering school. Central to this effort is a dedicated staff member who, with the guidance of the Dean and department chairs, designs and implements a master plan of coordinated recruiting for all our departments. The plan will feature strategies tailored to regions (domestic or international), disciplines, and cultural backgrounds. In addition, the staff member will coordinate and assist efforts of individual faculty, maintain communication channels with schools and student populations, and track the efficacy of various recruiting methods.
- **Retaining SEAS students.** The School will proactively recruit its own students, both at undergraduate and master's levels, into our PhD program. The Dean has recently established a mechanism by which selected undergraduates were offered early admission, waiver of most applications materials (GRE scores, application fee, recommendation letters, etc.), as well as a cash bonus. The School will amplify the effort by offering similar waivers to an even broader population of SEAS undergraduate and master's program students, in conjunction with open house or panel discussions of graduate school opportunities at WashU. The School will also establish a formal mechanism by which master's program students can be funded by participating in sponsored research projects, thereby encouraging more students to apply to our PhD programs.

- **International outreach.** WashUy has long been a leader in promoting international collaborations. The flagship of this effort is the establishment of the McDonnell International Scholars Academy, which partners with over 30 premier institutes all over the world. The Engineering school faculty has also been actively pursuing collaborations across the globe, most notably under the MAGEEP network. The School will leverage these existing partnerships to more proactively promote recruitment of international students. In addition to centralizing outreach efforts to targeted institutions, the School will create international bachelor's and master's degree exchange programs to foster a pipeline of PhD candidates from strong Engineering departments.
- **Expanding fellowship opportunities.** To attract exceptional graduate applicants, the School will consider raising funds to establish endowed fellowships. These fellowships will be broadly advertised and offered to outstanding candidates well before the admissions deadline. The School will also work with the university to streamline the application process of fellowship applications to reduce the effort of applicants and lower the barrier of entrance.
- **Recruiting with diversity.** As part of a broader effort in improving diversity, the School will leverage the centralized recruiting mechanism to more broadly attract students with diverse backgrounds, and in particular candidates from underrepresented minority groups. The school's recruiting staff will frequently attend, on behalf of all our departments, conferences such as SWE and NSBE to reach out to these groups. The staff will also establish and maintain connections with communities of underrepresented minority students, both in college and through K-12, and pursue proactive efforts such as bringing students to our campus for tours.

Successful implementation of these efforts will result in an increase in the total number of applicants and enrollment to our PhD programs (locally, domestically, and internationally), the number of underrepresented minority applicants, and the number of fellowship awardees. The increase in quality of students will have a longer-term impact on overall research metrics, including publication count, faculty expenditure, academic placement of PhD students, faculty hires, and school ranking.

2. Developing interdisciplinary PhD programs

There is a growing demand for interdisciplinary programs that cut across boundaries between departments and even schools. Many of our best doctoral students feel constrained by the requirements of PhD programs in traditional disciplines, while careers in industry and academia place increasing demands on skills and backgrounds in multiple disciplines. At the same time, SEAS and WashU more broadly have many strengths that are hard to define precisely within traditional departmental boundaries. By building umbrella structures around research areas of interest, we could boost our visibility in those areas, harvest the diversity and strength among the broader faculty, increase the appeal of our PhD programs, and better prepare our students for future careers.

The School will explore a general framework to create interdisciplinary PhD programs. The framework will use the experience of existing and upcoming programs, such as the Institute of Material Science & Engineering PhD program and the Imaging Science PhD program, both incorporating faculty from multiple departments and schools at WashU. The framework will provide guidance on addressing several key challenges in establishing interdisciplinary programs, including identifying faculty with complementary expertise and commitment to collaboration, developing rigorous and yet flexible multi-disciplinary curricula that leverage existing resources in each department, and resolving clashing funding models between departments and schools while pursuing external support (e.g., training grants). These programs, once established, should be broadly advertised

domestically and internationally to achieve the goal of raising our profile and improving our PhD pipeline.

3. Improving PhD programming

A successful PhD program produces well-rounded graduates who are prepared well for their next steps in industry or academia. While our program places strong emphasis on technical training, students receive little training on nontechnical skills that are essential for a successful career. Perhaps an even greater issue is that, in contrast to the situation with undergraduate students, there is little support in place for career development of PhD students, either from the school or the university. By offering comprehensive non-technical skills training and centralized career support, we would be able to significantly improve the capability and career-readiness of our PhD cohort, which would in turn have a positive impact on PhD recruiting.

There are a variety of nontechnical skills that can make a significant difference both in students' performance within our program and in their competitiveness on the job market. Perhaps the weakest such skill of an Engineering PhD student is communication skills, including written (e.g., papers and grants), oral (e.g., presentations and interviews), and graphical (e.g., figures in papers and presentations). The Engineering Communications Center (ECC) offers courses designed to improve technical writing skills as well as personal assistance on presentations. The ECC will extend its service to cover more aspects of communications, provide more in-depth training in key communication skills, and better advertise their services to the graduate students.

Besides communication skills, the School will introduce a mandatory course on research ethics, responsible conduct, and diversity that is focused on Engineering disciplines. In addition to supporting PhD programming, seminars in these topics are required for trainees by many funding agencies. Short courses and seminars will be also offered around career development, including discussion of different career paths and entrepreneurship, as well as other soft skills such as etiquette and networking skills. Besides in-school resources, external funding (e.g., NSF NRT) will be sought to support these efforts.

We will provide centralized support for PhD career department and tailor our strategies to specific career paths. A disproportionately large part of our reputation and ranking is based on academic placements. Therefore, efforts that can improve the quality and quantity of our PhD students taking up academic positions would have an immense impact. One possible strategy is to institute a mentorship program for a selected student group interested in academic positions. These students would be identified early in the program and matched with faculty members who provide mentoring in various aspects essential to starting an academic career, such as course instruction, grant-writing, and networking. The faculty mentor will also be the champion of and actively promote the student in the broader research community.

For students interested in industry and government careers, the School will provide dedicated PhD-centric career services including initiating and maintaining relations with companies and government agencies, identifying internship and full-time employment opportunities and matching them with our students, and proactively assisting students with their individual needs. Such services will leverage the newly established position of Industry Relations Manager and will work closely with student organizations such as AGES.

Besides career support, the School will provide additional services to improve the wellbeing of our PhD cohort. Example services include outside-class academic support (e.g., tutoring), ombudsperson for mediating disputes,

and mental health services. While similar services are already offered by the School or the University, they mainly serve the undergraduate population, and dedicated services at the graduate level are urgently needed to fit the unique demands of doctoral students.

Successful implementation of non-technical skills training, career development support, and wellbeing services will lead to measurable results such as higher retention rate of PhD students, better placement in industry and academia, and positive feedback from employers. In the long term, these efforts will help establish a healthy cycle of PhD recruitment, support and placement that propels the school towards excellence and leadership in research.