

## Academic and Graduate Program Structures for Fostering Interdisciplinary Research

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Cornell University takes a multi-faceted approach to encourage meaningful scholarly engagement among disciplines in graduate education and in research more generally, driven in part by the institution's long-standing commitment to discovery-driven and problem-based research with a focus on translation and application to benefit society. We do this through graduate program structures at the level of students' graduate committees and in the purposeful intellectual and operational design of graduate programs, through cross-cutting research centers established with external and institutional funding, and through targeted activities designed specifically to cultivate interdisciplinarity.

### **Structure of Graduate Fields (Programs) and Graduate Committees**

Graduate academic programs at Cornell are interdisciplinary by design. Graduate fields (programs) through which graduate degrees are offered are voluntary groupings of members of the university graduate faculty who have scholarly interests in common and who wish to exercise shared responsibility for an area of inquiry and for the admission, education, and financial support of graduate students. Graduate fields are independent of traditional college or department structures, so they may draw together faculty members from several disciplines in accordance with scholarly interests. The majority of graduate faculty are members of more than one graduate field; some graduate faculty are members of as many as six graduate fields.

Research doctoral students are required by faculty legislation to include at least three graduate faculty on the doctoral advising committee (called the special committee), representing one major and two minor areas of study. Most special committees include faculty from two or three graduate fields; often the special committees include faculty spanning two or more of our four categories of broad disciplines (humanities and arts, life sciences, physical sciences and engineering, social sciences). This structure encourages students to develop disciplinary depth and multidisciplinary breadth, and creates opportunities for faculty across disciplines to build active scholarly relationships. Our newest graduate education campus, Cornell NYC Tech in New York City, goes a step further by requiring that graduate advising committees include academic faculty and industry/business advisors, further stimulating cross-pollination not only across disciplines but also across academic and entrepreneurial/corporate cultures.

### **Multi-disciplinary Research and Engagement Centers**

Cornell has more than 100 interdisciplinary research organizations (centers and institutes) whose mission is to bring together faculty and students from across the university to pursue research, teaching, and outreach on broad scholarly and socially-relevant topics. Most of these centers and institutes were created to align with national and global needs, providing direct benefits to individuals, groups, and society. Our centers and institutes are supported with a mix of external (e.g., federal, foundation) and internal institutional resources.

Among these, we have two national research centers serving broad national and international scientific communities and reflecting partnerships of academia, government, and industry: Cornell High Energy Synchrotron Source (CHESS) and Cornell NanoScale Facility (CNF). CHESS, a high-intensity X-ray source, was recently renewed by the National Science Foundation with a five-year, \$100-million award, and provides state-of-the-art synchrotron radiation facilities for research in Physics, Chemistry, Biology, and Environmental and Materials Sciences. Through this facility, Cornell graduates roughly 20 percent of the nation's PhD's trained in accelerator science and advanced X-ray technology.

Other research centers and institutes bring faculty and students together across disciplines to address the study of economy and society, sustainability, energy systems, inequality, and other cross-cutting societal challenges (<http://www.cornell.edu/research/centers.cfm>). One example is the Atkinson Center for a Sustainable Future (ACSF), whose mission is to advance interdisciplinary research in Energy, the Environment, and Economic Development and cultivate innovative collaborations within and beyond Cornell to foster a sustainable future for all. The ACSF employs a variety of strategies to promote interdisciplinary collaborations engaging graduate students, postdocs, and faculty, including a competitive academic venture fund, topical discussion groups, faculty fellows across campus, and an actively engaged faculty advisory board with membership spanning many disciplines. ACSF focuses its efforts on six priority problem-driven areas, including agriculture and food systems, energy transitions, one health, sustainable communities, new materials, and computational sustainability.

### **Interdisciplinary Program Efforts**

One example of strong interdisciplinary programs is Cornell's Society for the Humanities (<http://www.arts.cornell.edu/sochum/>), established in 1966. The Society gathers graduate students, postdocs, faculty, and distinguished visitors to pursue research on broadly interdisciplinary focal themes, producing path-breaking interdisciplinary dialogues, theoretical reflections, and frameworks for possible societal responses. The Society sponsors special theme projects through which to frame and focus its efforts annually; recent themes have included Sensation, Risk, and Water. The focus on Risk, for example, reflected on historical, theoretical, and global understandings of risk, drawing from approaches in the humanities, life sciences, economics, and technology. The Water theme encouraged participants to cross disciplinary boundaries by considering water as a "an object of conflict and contest, as boundary, as divider of regions and cultures, ... a source of life and wealth, and as a medium of communication, migration, transport, commerce, and redistribution." Theme projects, by design, pose questions from multiple perspectives and employ approaches for bridging disciplines. Many of the Society's faculty and graduate students are active members of the Humanities, Arts, Sciences, and Technology Advanced Collaboratory (HASTAC) (<http://www.hastac.org/about>), an influential community of graduate students, faculty, and others working at the intersection of the arts, humanities, engineering, and sciences through creative use of technology.

### **Lessons Learned**

Purposeful structures can be designed and implemented to enhance the likelihood of creating opportunities for intellectual collisions, resulting in ongoing interdisciplinary dialogue and collaborations. The potential for success of these structures is enhanced through strategic deployment of funding, space, and other resources, and fostered through the vision and commitment of one or more vocal and respected faculty champions.