ROBOTICS (PHD)

Graduate School

Program Website (https://robotics.cornell.edu/graduate/)

CIP: 14.4201 | **HEGIS:** 4904.00 | **NYSED:** 43137

Graduate Fields

Aerospace Engineering (https://catalog.cornell.edu/graduate-school/aerospace-engineering/), Computer Science (https://catalog.cornell.edu/graduate-school/computer-science/), Electrical and Computer Engineering (https://catalog.cornell.edu/graduate-school/electrical-computer-engineering/), Mechanical Engineering (https://catalog.cornell.edu/graduate-school/mechanical-engineering/)

Program Description

Cornell offers a Robotics Ph.D. program through the Aerospace Engineering (AE), Computer Science (CS), Electrical and Computer Engineering (ECE), and Mechanical Engineering (ME) graduate fields. Robotics is interdisciplinary in nature – it combines expertise across science and engineering, including mechanism design, modeling, dynamics, control, hardware, actuators, sensing, data science, machine learning, computing, and social science. Furthermore, with the recent surge in robotics applications, industry investment, and public discourse regarding autonomous systems, robotics is moving beyond an academic specialty to having a large societal impact. The purpose of the Robotics Ph.D. is to train world-class researchers and leaders in the interdisciplinary area of robotics.

The curriculum for the program is based on several required courses, complemented by one minor in the student's field and another minor that can be chosen from any of the minors at Cornell. The required courses consist of courses in the foundation of robotics, community-engaged research, and ethics. The rest of the curriculum is shaped by the interests of each Ph.D. student. Each student will be required to complete a sufficient number of courses to satisfy two minors.

The Ph.D. program provides advanced levels of training suitable for students pursuing careers in research and development, education, or government service. The field does not admit students into an M.S.-only degree program; applicants may apply for the Ph.D. program with a bachelor's degree. Ph.D. students must take a qualifying examination in addition to the examinations required by the Graduate School. Typically, the qualifying exam is taken at the end of the first semester for students entering with a Master's degree and at the end of the second semester for those entering with a Bachelor's degree. Teaching experience for two semesters is required of Ph.D. students.

Faculty and Ph.D. students are located both in Ithaca and in New York City at the Cornell Tech campus (https://tech.cornell.edu/). Prospective doctoral students can apply to any PhD program (https://gradschool.cornell.edu/admissions/) represented by the robotics faculty.

Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 72

Program Requirements

- 10 semesters of GRAD research course
- Minimum Semesters for Degree: 6

Graduate School Milestones

- Responsible Conduct of Research Training: Required
- Open Researcher and Contributor ID (ORCID): Required
- Student Progress Reviews (SPR) begin: First Year
- Examination for admission to candidacy (A Exam): By the end of the third year, before the seventh semester begins
- Defense of Dissertation (B Exam): By the end of the fourteenth semester

Field Specific Milestones

- Qualifying Examination (Q Exam): By end of Summer of first year
- Two semesters of teaching assistantship required

Course Requirements

Additional course requirements may be set by the student's Special Committee. Program specific requirements that apply to all students are included below.

Year 1

- Two technical breadth classes

Year 2

- Community Engagement Seminar
- Ethics Course

Other

- Technical depth courses to fulfill requirements of minor

Technical breadth in robotics

Students are required to take two foundational courses in robotics during their first year. These courses will be chosen from an approved list. Currently, the list consists of: foundation of robotics (offered by CS, cross listed with MAE and ECE), autonomous mobile robots (offered by MAE, cross listed with CS and ECE), human-robot interaction: algorithms and experiments (offered by MAE, cross listed with CS), fast robots (offered by ECE, cross listed with MAE), robot perception (offered by MAE, cross listed with ECE), robot learning (offered by CS).

Technical depth in discipline

The Graduate school requires (https://gradschool.cornell.edu/academic-progress/requirements/academic-structure/) Ph.D. students to choose one major and two minor subjects of study. For the Robotics Ph.D., the major subject of study is "Robotics" and one of the minor subjects must be the other subject in the student's field. For example, a robotics student in the AE field will have their major subject be "Robotics", one of their minor subjects be "Aerospace Engineering", and their other minor subject be in any other field of study.

Research skills

The qualifying (Q) exam, to be taken by the beginning of the third semester, includes a presentation on state-of-the-art topics in robotics, chosen by the student and approved, ahead of time, by the qualifying exam committee. During the qualifying exam, the student presents a

literature review, and is asked questions on the broader implications of the research papers they studied.

Community engagement seminar

All students in the program will be required to take the community engagement seminar during their second year. This seminar examines principles, frameworks, and methodologies for addressing societal problems arising from robotics research. By participating, students will gain a deeper appreciation of the ways their research can serve a public purpose, and learn methods to be responsive to community needs.

Ethics

Students will choose one of an approved list of existing classes. Examples include INFO 4301 Ethics in New Media, Technology, and Communication, ECE 2750 Robot Ethics, and INFO 4270 , INFO 1260 Choices and Consequences in Computing, FSAD 6800 Ethical Design: Engine of Positive Change. Students may choose another suitable course and have it approved by their special committee.

University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (https://registrar.cornell.edu/service-resources/college-registrar-directory/) for more information.

Non-academic Requirements

Conduct Matters. Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

Financial Obligations. Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.