THEORETICAL AND APPLIED MECHANICS (PHD)

Graduate School

Program Website (https://www.engineering.cornell.edu/mae/)

CIP: 14.1101 | **HEGIS:** 0921.00 | **NYSED:** 13339

Graduate Field

Theoretical and Applied Mechanics (https://catalog.cornell.edu/graduate-school/theoretical-applied-mechanics/)

Program Description

The Field of Theoretical and Applied Mechanics provides a strong background in engineering science and applied mathematics, which prepares students to carry out high-quality analytical or experimental research and to handle a wide variety of modern engineering problems. Course work provides a broad education in the mechanics of rigid and deformable bodies, applied mathematics, and modern experimental techniques.

Current research topics include solid mechanics (modeling of manufacturing processes, quantitative ultrasonic and acoustic emission techniques, fracture mechanics, composite materials, mechanics of human-powered vehicles, nonlinear elasticity); fluid mechanics (granular materials, strongly swirling flows); dynamics and space mechanics (evolution of the solar system, planetary rings, and rotation of celestial bodies, qualitative analysis of dynamic problems in nonlinear mechanics, bifurcations, chaos); and biomechanics and biomathematics (respiration of plants, how fishes swim).

All students are required to minor in at least one subject from a field outside of Theoretical and Applied Mechanics. Frequently selected minors are aerospace engineering, applied mathematics, applied physics, astronomy, electrical and computer engineering, geophysics, materials science, mathematics, mechanical engineering, physics, and structural engineering.

Ph.D. students take a qualifying examination. For incoming students with a Bachelor's degree, the examination is usually held after they have completed two semesters of graduate studies at Cornell. For incoming students with a Master's degree, the examination is held after they have completed one semester of graduate studies at Cornell. Two semesters of teaching experience are required.

Concentrations

- Dynamics and space mechanics
- Fluid mechanics
- Mechanics of materials
- Solid mechanics

Program Information

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

Program Requirements

- Minimum of 6 semesters of GRAD 9010 Graduate-Level Research (12 credits per semester)
- 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 third year, before seventh semester begins
- Defense of Dissertation (B Exam): By the end of the fourteenth semester

Field Specific Milestones

- Qualifying Examination (Q Exam): Spring of first year; if the student has an MS and the topic is offered they may take the Q Exam in January of their 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.

- MAE 6949 Seminar for M.S. and First-Year MAE Ph.D. Students (One enrollment, 1 credit)
- MAE 7999 Mechanical and Aerospace Engineering Colloquium (Two enrollments, 2 credits)
- 4 Topics courses (minimum 12 credits)
  - 2 graduate courses in Applied Mathematics
  - 1 graduate course in Dynamics and Space Mechanics
  - 1 graduate course in Solid Mechanics, Fluid Mechanics, or Mechanics of Materials
  - These courses must be completed within the first two semesters
  - Students must earn a B- or better in each course with a 3.0 overall GPA

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.

Learning Outcomes

- Make an original and substantial contribution to the discipline
- Demonstrate advanced research skills
- Demonstrate commitment to advancing the values of scholarship by keeping abreast of advances in the field, showing a commitment to professional development and supporting a learning environment through teaching, collaborating, or mentoring
- Demonstrate professional skill in ethics, communication, and giving and receiving feedback