The Committee on Computational and Applied Mathematics

Committee website: https://cam.uchicago.edu/

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• Guillaume Bal (Statistics and Mathematics, CCAM)

Professors
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• Mihai Anitescu (Statistics and Argonne, CCAM)
• Rina Foygel Barber (Statistics)
• Aaron Dinner (Chemistry and James Franck Institute)
• Brent Doiron (Statistics, Neurobiology)
• Todd Dupont (Computer Science, Mathematics, and James Franck Institute)
• Carlos Kenig (Mathematics)
• Gregory Lawler (Mathematics and Statistics)
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• John Reinitz (Statistics and Ecology and Evolution, CCAM and Molecular Genetics & Cell Biology)
• Mary Silber (Statistics, CCAM)
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• Nathan Srebro (TTIC and Computer Science)
• Matthew Stephens (Statistics and Human Genetics)
• Gregory Voth (Chemistry and James Franck Institute)
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• Jeremy Hoskins (Statistics, CCAM)
• Yuehaw Khoo (Statistics, CCAM)
• Alisa Knizel (Statistics)
• Arvind Murugan (Physics)

Affiliates:
• Fausto Cattaneo (Astronomy and Astrophysics)
• Carlos Kenig (Mathematics)
• Gregory Voth (Chemistry and James Franck Institute)

Programs and Requirements for the Ph.D.

The use of computational, mathematical and statistical modeling in various areas of science has increased dramatically in recent years, triggered by massive increases in computing power and data acquisition. Mechanistic models for physical problems that reflect underlying physical laws are being combined with data-driven approaches in which statistical inference and optimization play key roles. These developments are transforming research agendas throughout statistics and applied mathematics, and are impacting a broad range of scientific disciplines.

A critical need now exists to train the next generation of computational and applied mathematicians to confront data-centric problems in the natural and social sciences. In response to these developments, the Committee on Computational and Applied Mathematics (CCAM) has been formed to provide graduate training in Computational and Applied Mathematics that reflects both the scientific demands and the unique strengths of the University of Chicago faculty across the Division of the Physical Sciences, including the recent hiring of several new faculty under a Computational and Applied Mathematics Initiative (CCAM).
ADMISSIONS

The program will admit a small number of exceptionally qualified students. Each student will be assigned to a member of the computational and applied mathematics committee to plan and approve a student’s course of study until their dissertation committee is formed. The executive committee monitors each student’s progress through the program at quarterly meetings.

COURSE REQUIREMENTS

First year students are required to take two 3-quarter-course sequences; one is an analytic/physical mathematics+modeling track, which includes applied dynamical systems, applied functional analysis, and PDE, and the other track is a computational one that includes matrix computation, optimization and machine learning.

In addition to these first year required courses, students take an elective course each quarter. They are assigned a first-year advisor who will help them select appropriate elective courses for their interests.

At the end of the first year, students are assessed in these areas with a pair of exams, one on each of the tracks. For these, students must choose 2 out of the 3 courses, for each track, for their exam questions.

While students need only take courses in their first year, most take courses well into their second, in addition to taking reading courses and research seminars.

THESIS ADVISOR AND DISSERTATION COMMITTEE

Students typically select a thesis advisor by the end of their second year, and choose a three-person thesis committee with that advisor.

By the end of the third year, each Ph.D. student must have a dissertation advisor and, after consultation with their advisor, shall establish a thesis committee of at least three faculty members, including the advisor. At least two of the dissertation committee members must be faculty of the Committee on Computational and Applied Mathematics. A CAM form listing the committee members, with their signatures, must be approved by the Director of CCAM, and filed with the CAM student affairs administrator by the end of Spring Quarter of the third year. The composition of the committee may be changed at any time if the student or faculty so choose; however, it must always include the student’s dissertation advisor and at least two of the committee members must be faculty members from the Committee on Computational and Applied Mathematics. Any such change must be filed as a resubmitted and newly completed and signed form with the CAM student affairs administrator.

For more details on this new program, see https://cam.uchicago.edu/academics/graduate-programs/phd-program/

PROGRAMS AND REQUIREMENTS FOR THE M.S. DEGREE

The main requirements of the M.S. program are successful completion of a sequence of at least nine approved courses.

Students who wish to do so can pursue the option of a master’s degree with thesis. Students who pursue this option are required to complete the above course requirements and write and defend a master’s thesis under the guidance of a CAM advisor.

The option without master’s thesis may be completed in nine months (three full-time quarters) or more. The option with a master’s thesis may be completed in 15 months (four full-time quarters, excluding summer) or more. Both options can extend up to two years of courses.

A detailed set of requirements and milestones can be found at https://voices.uchicago.edu/cammasters/current-students/. A substantial fraction of available courses are the same as for the Ph.D. degree.