

APPLIED MATHEMATICS PH.D.

<https://ceps.unh.edu/integrated-applied-mathematics/program/phd/integrated-applied-mathematics>

Description

The IAM Program prepares students for research and teaching careers in the mathematical solution of critical problems in science and engineering. The emphasis of the IAM program is on the use of mathematics and computing to facilitate impactful interdisciplinary research. Accordingly, all students must achieve a high level of training through the required coursework. An IAM Ph.D. candidate is expected to achieve expertise in both applied and computational mathematics as well as one area of specialization including, but not limited to: Fluid Dynamics, Dynamical Systems, Plasma and Space Physics, Mathematical Geo- or Environmental Science, Materials and Solid Mechanics, or Biophysics.

Admission Requirements

Applicants to the IAM Ph.D. Program are expected to have a bachelor's degree or master's degree in mathematics or an appropriate science or engineering field.

Applying

Please visit the [Graduate School website](#) for detailed instructions about applying to the program.

Requirements

Code	Title	Credits
Required Courses		
PHYS 931	Mathematical Physics	3
IAM 830	Graduate Ordinary Differential Equations	3
IAM 851	Introduction to High-Performance Computing	3
IAM 932	Graduate Partial Differential Equations	3
IAM 933	Applied Functional Analysis	3
IAM 961	Numerical Analysis I: Numerical Linear Algebra	3
IAM 962	Numerical Partial Differential Equations	3
Select a 2-course specialization sequence:		6-7
MATH 847 & IAM 950	Introduction to Nonlinear Dynamics and Chaos and Spatiotemporal and Turbulent Dynamics	
PHYS 953 & PHYS 951	Magnetohydrodynamics of the Heliosphere and Plasma Physics	
ME 807 & ME 909	Analytical Fluid Dynamics and Viscous Flow	
Select a minimum of three technical electives: ¹		9
CS 830	Introduction to Artificial Intelligence	
CS 858	Algorithms	
IAM 940	Asymptotic and Perturbation Methods	
ME 812	Waves in Fluids	
ME 922	Continuum Mechanics	
PHYS 812	Introduction to Space Plasma Physics	
PHYS 818	Introduction to Solid-State Physics	
PHYS 941	Electromagnetic Theory I	
PHYS 965	Advanced Solid-State Physics	
Total Credits		36-37

¹ Additional elective as approved by your advisor and program.

Candidacy Requirements

Students must pass a three part Ph.D. qualifying exam:

- Comprehensive exam in mathematical methods
- Comprehensive exam in scientific computing
- Oral or written exam in a specialization area

Students must select a research adviser and have identified a research topic.

Dissertation

Students must submit a written thesis proposal and give a seminar presentation summarizing the proposal to a dissertation committee.

Upon completion of research, a student must give a seminar summarizing the research objectives, methods, findings, and significance.

Students must submit a dissertation that includes original research in applied mathematics. The dissertation must comply with all policies put forth by the Graduate School

Student Learning Outcomes

- Students are skilled at mathematical manipulations and analytic calculations broadly covering the field of applied mathematics.
- Students have developed sufficient mathematical background and understanding of key concepts to have a functional literacy in modern applied mathematics journals.
- Students can use numerical algorithms to approximate solutions to mathematical problems which are intractable by hand calculation and understand the impact of consistency, stability, and accuracy in the context of numerical computing.
- Students have made independent contributions to a significant mathematical research project and have clearly demonstrated the ability to conduct high-level, self-directed research in applied mathematics.
- Students are capable of disseminating the results of their research through written (e.g., journal) publications and oral presentations or seminars.