What is Applied Mathematics?

Applied mathematics is a combination of theoretical, computational, and modeling techniques used to address questions arising in the real world. Applied mathematicians work in both mathematics as well as fields such as finance, economics, engineering, and the natural and social sciences.

Applied math specialization overview:
- The applied math curriculum is designed to give students a solid mathematical foundation while emphasizing mathematical topics that are often used to solve real world problems, from disciplines as varied as the natural sciences, business, economics, etc. Therefore, a number of required courses differ between the mathematics and applied mathematics specialization. In particular, the applied specialization requires the study of differential equations at the 300-level, and the 400-level applied math courses all explore this topic in further detail.
- The applied math specialization requires more advanced training in computer programming, as applied math is computationally demanding. Programming skills gained in the applied math specialization not only allow one to solve a range of mathematics programs, they also provide a skill that is highly valued in industry.
- Applied mathematics students can pair their major with a minor (or second major) in which they can apply what they learn.
- The applied math specialization requires one non-Capstone 400-level course. This one course must be designated as an applied course.
- *Where data integrates into mathematics.* Mathematics allows a systematic analysis of information blending logic, experimentation and intuition. With dramatically more powerful and ubiquitous computers generating and analyzing bigger datasets, the applied math specialization introduces students to the tools and techniques to integrate the mindset of a mathematician to solve complex, real world problems involving data.

Applied math specialization coursework:
- *MAT 128, MAT 200, MAT 205, MAT 229, MAT 275 (Foundational math courses)* - fundamental mathematical techniques and methods which will be used and further expanded upon in future courses.
- *Correlate courses (lab sciences and CSC/Computational math)* - develop basic skills to 1) understand broader scientific fields and questions, and 2) solve such scientific and mathematical questions using computational methods.
- *MAT 310 (Real analysis)* - an advanced study of limits, sequences, and functions provides 1) deeper insight into calculus concepts, and 2) rigorous understanding of theorems used to study differential equations, numerical analysis, and dynamical systems.
- *MAT 326 (Differential equations)* - theoretical and computational techniques to study equations describing real world phenomena ranging from biology, physics, chemistry, economics, etc.

- *STA 215 (Statistical inference)* - statistical methods to study, describe, and make inferences from real world data sets.
- *MAT 498 (Capstone)* - culminating course to independently study a topic in applied mathematics outside the scope of other coursework.
- *Depth Requirement - complete 2 courses from one of the following 4 areas.*
    - *Probability and Statistics* - MAT 316, all STA courses at the 300 or higher level, BIO 471/CSC 471; develop theoretical and computational methods to study, describe, make inferences from, and form mathematical models for real world data sets.
    - *Analysis* - MAT 331, MAT 320, MAT 453; develop theory and techniques to solve complex problems of calculus, linear algebra, and differential equations, including a rigorous understanding of approximation and convergence.
    - *Dynamical Systems* - MAT 330, MAT 454, PHY 401; learn how to create and analyze differential equations models of real world phenomena using a combination of theory and computational methods.
    - *Computational Mathematics* - MAT 341, CSC 230, CSC 335, CSC 445, MAT 331; use computational methods to solve complex mathematical problems, and develop a deep understanding of the speed, accuracy, and convergence of such methods.

Information on potential careers for math majors: [Careers & Graduate Schools](#)