Statistics and Data Science

Statistics — as a core discipline focusing on data-driven discovery, understanding, and decision-making — is rapidly evolving and advancing in the data science era. The new Department of Statistics and Data Science (SDS) strives to be a world-class department with outstanding scholars who will transform the university's intellectual community not only through their own activities and achievements but also through synergistic collaborations with faculty and departments across Arts & Sciences, the McKelvey School of Engineering, the School of Medicine, and all of the other schools at the university.

The department aims to provide a foundation for ambitious and innovative digital transformation across a range of disciplinary areas, filling a vital niche in the current academic landscape that leverages the emerging opportunities of computational and data science. SDS values foundational as well as transdisciplinary scholarship and will focus on using data to offer solutions to some of the most complex global issues.

The Department of Statistics and Data Science offers two Bachelor of Arts degrees:

1. Statistics: The BA in Statistics provides flexible and rigorous training in statistics for a wide range of career paths in industry or further graduate studies.
2. Data Science: Jointly offered with Computer Science & Engineering (CSE), the BA in Data Science offers students the formal foundation needed to understand the applicability and consequences of the various approaches to analyzing data with a focus on statistical modeling and machine learning.

Both programs are offered as a prime or a double major. In addition, SDS offers a Minor in Statistics and an Accelerated BA/MA in Statistics. All our programs are flexible enough to allow a broad range of double majors or major/minor combinations. Majors are encouraged to complete additional work in other related areas.

Why choose the BA in Statistics? Data permeates every aspect of our lives. The ability to comprehend, synthesize, analyze, extract valuable information, and draw sound conclusions from data is a must-have in almost all human endeavors and activities. Statistics not only facilitates the implementation and evaluation of mathematical and computational models that represent reality but also acknowledges the inherent randomness in data, rendering it indispensable for the making of informed decisions in a wide range of domains.

Why choose the BA in Data Science? Data science arises in the midst of a new era of data revolution and the challenges faced by the standard mathematical and statistical approaches when dealing with massive datasets, high dimensionality, and extremely complex data objects. These datasets appear in modern applications ranging from medicine to climatology to social sciences, to name just a few. Students trained in data science are already in high demand across a wide spectrum of industries. Data science is by nature interdisciplinary, requiring the mastery of a variety of skills and concepts, including many traditionally associated with the fields of statistics, computer science, and mathematics. In crafting the BA in Data Science, SDS and CSE have sought to leverage courses that are already taught as much as possible, while at the same time judiciously introducing a handful of new courses that capture unique aspects at the intersection of the two disciplines. The program features a novel practicum component during which students undertake a mentored experience to apply their knowledge and skills in industry or research.

The Accelerated BA/MA in Statistics allows highly qualified undergraduate majors to earn both the BA and MA degrees with two additional semesters of work (i.e., usually a total of five years). Participants can count up to 15 units of 4000-/5000-level coursework earned during the four years of undergraduate study (with grades of B or better) toward the MA course requirements. Counting these 15 units makes it possible to finish the master's requirements in one additional year, but the program is still fast-paced and requires a lot of intense work and careful planning. For more information, visit the Statistics and Data Science page of the graduate Arts & Sciences *Bulletin.*

Overview of Faculty Research

The interdisciplinary interests of our faculty span a broad range of areas including the application of statistics and data science to medicine, finance, environmental sciences, and technology. Research interests of our faculty include the following:

- Bioinformatics
- Bootstrap methodology
- Environmental statistics
- Functional data analysis
- High-dimensional statistics
- Statistical computing for massive data
- Mathematical and statistical finance
- Model selection and post-selection inference
- Network analysis
- Objective Bayes
- Robust statistics
- Statistical and machine learning
- Time series and spatial statistics

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