MASTER OF SCIENCE IN STATISTICAL DATA SCIENCE

The purpose of the program is to deliver a comprehensive curriculum in the fields of statistics and data science to prepare students with diverse backgrounds (including statistics, mathematics, computer science, engineering, and other quantitative fields) for the data science workforce or a doctoral program. The program curriculum emphasizes the following aspects. First, students will be trained in-depth in modern statistical and machine learning techniques in addition to the classical statistics theory and applications. Second, they will learn and polish computational skills for various types of data sets, including large-scale data ubiquitous in business, technology, and science. Third, these two aspects of the program are built on a solid foundation of statistical theory and an understanding of mathematical principles behind techniques and algorithms; this blend is crucial for success in industrial and academic careers in the rapidly changing big data era. Finally, the program has built-in flexibility for different backgrounds and career plans through various electives.

Admission Requirements

Applicants to the program must:

- hold a baccalaureate degree from a regionally accredited institution, or shall have completed equivalent academic preparation as determined by the appropriate campus authority;
- be in good academic standing at the last college or university attended;
- have a 3.0 GPA in their earned undergraduate degree or in the last 60 semester (90 quarter) units completed, or have earned a post-baccalaureate degree;
- have a baccalaureate degree in a quantitative field, including but not limited to statistics, mathematics, computer science, physics, engineering, or relevant fields. Successful applicants are expected to have completed three semesters of calculus, linear algebra, and upper-division undergraduate courses in probability and statistics with a grade of B or better. However, an applicant who is deficient in probability theory and/or statistics may be admitted conditionally on passing MATH 440 Probability and Statistics I and/or MATH 441/741 Probability and Statistics II satisfactorily during the first calendar year of study;
- submit a TOEFL score (minimum 550/80) or IELTS score (minimum 7.0) obtained within the past two years if their undergraduate degree is from a country where the official language is not English.

Program Learning Outcomes

1. Apply statistical knowledge and computational skills to formulate problems, plan data collection, and analyze data to provide insight.
2. Build and assess statistical and machine learning models, and employ a variety of formal inference procedures.
3. Use mathematics to understand the underlying structure of common models used in statistical and machine learning.
4. Prepare data for use with a variety of statistical methods and models, and recognize how the quality of data and data collection affect conclusions.
5. Communicate effectively to a variety of audiences using oral, written, and visual modes.

Statistical Data Science (M.S.) — 30 Units

Core (15 Units)

Code	Title	Units
MATH 448	Introduction to Statistical Learning and Data Mining	3
MATH 742	Advanced Probability Models	3
MATH 748	Theory and Applications of Statistical and Machine Learning	3
MATH 760	Multivariate Statistical Methods	3
MATH 761	Computational Statistics	3

Upper-Division/Graduate Electives (12 Units)

No more than 9 units should be from undergraduate only courses. Per student's interested specialization and upon Graduate Advisor's approval, the student will be recommended to choose a set of electives in the following areas: Probability and Statistics Electives, Mathematics Electives, and Computer Science Electives.

Probability and Statistics Electives

Code	Title	Units
MATH 440	Probability and Statistics I	3
MATH 442	Probability Models	3
MATH 443	Introduction to Time Series Analysis	3
MATH 447	Design and Analysis of Experiments	3
MATH 449	Categorical Data Analysis	3
MATH 724	Introduction to Linear Models	3
MATH 741	Probability and Statistics II	3
MATH 899	Independent Study	1-3

Mathematics Electives

Code	Title	Units
MATH 400	Numerical Analysis	3
MATH 425	Applied and Computational Linear Algebra	3
MATH 430	Mathematics of Optimization	3
MATH 460	Mathematical Modeling	3
MATH 495	Introduction to Wavelets and Frames with Applications	3
MATH 710	Measure and Integration	3
MATH 725	Advanced Linear Algebra	3
MATH 771	Fourier Analysis and Applications	3
MATH 777	Partial Differential Equations	3

Computer Science Electives

Code	Title	Units
CSC 821	Biomedical Imaging and Analysis	3
CSC 865	Artificial Intelligence	3
CSC 869	Data Mining	3
CSC 872	Pattern Analysis and Machine Intelligence	3
CSC 874	Topics in Big Data Analysis	3

Culminating Experience (3 Units)

Candidates for the MS in Statistical Data Science must complete a Culminating Experience. Three options are available. Further information for these options can be obtained at the department website http://math.sfsu.edu

Code	Title	Units
MATH 892	Data Science Internship	3
MATH 895	Research Project	3
MATH 898	Master's Thesis	3