STATISTICS AND DATA SCIENCE, B.S.

Objectives

This degree program is designed for students who want an interdisciplinary course of study that combines computing with statistical analysis and data science. The degree is designed to meet the needs of students who expect to work in a data related field in industry or pursue a graduate degree in either statistics or data science.

Learning Outcomes

1. Students formulate and/or address questions about univariate data, collect/consider univariate data, analyze univariate data, and interpret results.

2. Students understand, calculate, and interpret descriptive measures #for quantitative and/or categorical variables to describe characteristics of the data.

3. Students create and interpret basic data visualizations for quantitative and categorical variables.

4. Students understand, carry out, and interpret basic inferential statistical procedures for one or two samples.

5. Students understand, carry out, and interpret results from estimating statistical models for bivariate data (e.g., linear regression, interpolation, extrapolation, predictive inference).

6. Students carry out and communicate results from extensive data-driven project(s) related to a real-life problem (extensive means that a single project takes several weeks to complete or a series of projects take more than several weeks to complete and are worth a significant portion of the final grade.

7. Students communicate their analyses and the interpretations of their results in a manner that is appropriate to their discipline in the context of the data (e.g., communication could be emphasized with presentations, oral explanations of results, oral/written answers for in-class work, written explanation of results).

8. Students understand the implications of study design, consider ethics in data collection, can select appropriate statistical methods for data analysis, and can explain the limitations of their analyses and interpretations.

9. Students become critical consumers of statistically-based results reported in popular media, recognizing whether reported results reasonably follow from the study and analysis conducted.

10. Students formulate and/or address questions about multivariate data, collect/consider multivariate data, analyze multivariate data, and interpret results.

11. Students use current statistical software or statistical packages that are appropriate to the discipline and context beyond basic Excel or a calculator.

12. Students write a program (using a programming language) to organize, manipulate, and analyze and extract information from the data.

13. Students study at least one type of advanced data-analytic methods such as (but not limited to): generalized linear models, Bayesian analysis, advanced probability theory and stochastic processes, non-linear models, machine learning, advanced study-design, big data analysis, econometrics, or statistical computing.

General Major Requirements

Students must complete the corresponding Bachelor of Science University Core requirements as defined by the Frank R. Seaver College of Science and Engineering; students will choose the proper sequence of University Core courses in consultation with their advisor.

Statistics and Data Science majors and minors are not permitted to enroll in a mathematics course without a minimum grade of C (2.0) in that course's prerequisite. A minimum grade of C (2.0) is required in each course in the lower division major requirements. A minimum cumulative grade point average of C (2.0) is required in the upper division major requirements for graduation.

Code	Title	Semester Hours
Lower Division Requirements		
MATH 131	Calculus I	4
MATH 132	Calculus II	4
MATH 190	Workshop in Mathematics I	2
MATH 205	Applied Statistics	4
MATH 234	Calculus III	4
MATH 249	Introduction to Methods of Proof	4
MATH 251	Applied Linear Algebra	4
MATH 290	Workshop in Mathematics II	1
CMSI 1010	Computer Programming and Laboratory	4
CMSI 2120	Data Structures and Applications	4
Subtotal		35
Upper Division Requirements		
MATH 304	Multivariable Statistics	4
MATH 323	Real Analysis I	4
or MATH 382	Applied Numerical Methods	
MATH 361	Probability and Mathematical Statistics	4
MATH 390	Workshop in Mathematics III	1
MATH 470	Machine Learning	4
MATH 480	Big Data Visualization	4
MATH 492	Workshop in Mathematics IV	1
MATH 504	Modern Computational Statistics	4
MATH 540	Deep Learning	4
Select one 4 semester hour upper division MATH elective chosen in consultation with their faculty advisor		4
Subtotal		34
Total Semester Hours		**69**

Bachelor of Science in Statistics and Data Science

(124 S.H.)

Course	Title	Semester Hours
First Year		
Fall		
MATH 131	Calculus I	4
MATH 190	Workshop in Mathematics I	2
CMSI 1010	Computer Programming and Laboratory	4
FFYS 1000	First Year Seminar	4
ORNT 1000	First Year Forum	0

University Core		4
Semester Hours		**18**
Spring		
MATH 132	Calculus II	4
CMSI 2120	Data Structures and Applications	4
RHET 1000	Rhetorical Arts	3-4
University Core		4
Semester Hours		**15-16**
Sophomore Year		
Fall		
MATH 205	Applied Statistics	4
MATH 249	Introduction to Methods of Proof	4
University Core		4
University Core		3-4
Semester Hours		**15-16**
Spring		
MATH 234	Calculus III	4
MATH 251	Applied Linear Algebra	4
MATH 290	Workshop in Mathematics II	1
University Core		4
University Core		3-4
Semester Hours		**16-17**
Junior Year		
Fall		
MATH 304	Multivariable Statistics	4
MATH 470 or MATH 540	Machine Learning or Deep Learning	4
University Core		4
Elective		3-4
Semester Hours		**15-16**
Spring		
MATH 390	Workshop in Mathematics III	1
University Core		4
Upper Division Elective		3-4
MATH 361	Probability and Mathematical Statistics	4
MATH 480 or MATH 504	Big Data Visualization or Modern Computational Statistics	4
Semester Hours		**16-17**
Senior Year		
Fall		
Select one of the following:		4
MATH 323	Real Analysis I	
MATH 3XXX or 4XXX Mathematics Elective		
MATH 470 or MATH 540	Machine Learning or Deep Learning	4
University Core		4
Upper Division Elective		3-4
Semester Hours		**15-16**
Spring		
MATH 492	Workshop in Mathematics IV	1
Select one of the following:		4
MATH 382	Applied Numerical Methods	
MATH 3XXX or 4XXX Mathematics Elective		
MATH 480 or MATH 504	Big Data Visualization or Modern Computational Statistics	4
University Core		4
Upper Division Elective		3-4
Semester Hours		**16-17**
Minimum Semester Hours		**126-133**