STATISTICS, BACHELOR OF SCIENCE

College of Letters & Science

Statistics enables us to make inferences about entire populations based on samples taken from them. Statistical methods can be applied to problems in almost every discipline and are vitally important to researchers in the agricultural, biological, environmental, social, engineering, and medical sciences.

The Program

Statistics majors may receive either a Bachelor of Arts (A.B.) or a Bachelor of Science (B.S.) degree. Both the A.B. and B.S. degree programs require coursework in both theoretical and applied statistics, highlighting the strong interdependence between statistical theory and its applications and computational aspects. The B.S. degree program has four tracks: Applied Statistics Track, General Track, Machine Learning Track, and the Statistical Data Science Track. Students choose one track to pursue based on their interests. Multiple track selection is not possible.

B.S. in Statistics-Applied Statistics Track emphasizes statistical applications. This track is recommended for students who are interested in applications of statistical techniques to various disciplines including the biological, physical and social sciences.

B.S. in Statistics-General Track emphasizes statistical theory and is especially recommended as preparation for graduate study in statistics.

B.S in Statistics-Machine Learning Track emphasizes algorithmic and theoretical aspects of statistical learning methodologies that are geared towards building predictive and explanatory models for large and complex data. It is recommended for students interested in pursuing graduate programs in statistics, machine learning, or data science, as well as for students interested in learning statistical techniques for industry.

B.S. in Statistic-Statistical Data Science Track emphasizes data handling skills and statistical computation. This track is recommended for students interested in statistical learning methodology, advanced data handling techniques and computational aspects of statistical analysis.

Major Advisors

For a current list of faculty and staff advisors, see Undergraduate Advising (https://statistics.ucdavis.edu/undergrad/advising/).

The requirements for continuing students to change into the Statistics major can be found at Statistics Change of Major Requirements & Process (https://statistics.ucdavis.edu/undergrad/advising/change-of-major/statistics/).

Students are encouraged to meet with an advisor to plan a program as early as possible.

Career Alternatives

Probability models, statistical methods, and computational techniques are used in a great many fields, including the biological, physical, social, and health sciences, business, and engineering. The wide applicability of statistics is reflected in the strong demand for graduates with statistical training in both the public and private sectors. Employment opportunities include careers in data & policy analysis in government & industry, financial management, quality control, insurance & healthcare industry, actuarial science, engineering, public health, biological & pharmaceutical research, law, and education. Students with an undergraduate degree in statistics have entered advanced studies in statistics, economics, finance, psychology, medicine, business management & analytics, and other professional school programs.

The major requirements below are in addition to meeting University Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/) & College Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/); unless otherwise noted. Respective of the Track, the minimum number of units required for the Statistics Bachelor of Science are 75, 82, 79, & 79.

Applied Statistics Track

Code	Title	Units
Preparatory Subject Matter		
Mathematics		
Choose a series:		9-12
MAT 016A & MAT 016B	and (Discontinued for spring 2025) [**] DISCONTINUED FO	
MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine	
MAT 019A & MAT 019B & MAT 019C	Calculus for Data-Driven Applications and Calculus for Data-Driven Applications and Calculus for Data-Driven Applications	
MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus	
MAT 021 series preferred.		
MAT 022A	Linear Algebra	3
Computer Science Engineering		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ECS 036A	Programming & Problem Solving	
Statistics		
Choose one:		4
STA 013	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
STA 032 or STA 100 preferred.		
Cluster Elective Prerequisites		
Two introductory courses serving as the prerequisites to the chosen Cluster Electives (see **Cluster Electives** section below).		7-8
Note: Additional coursework beyond this requirement may be needed to fulfill the Cluster Elective prerequisites.		
Preparatory Subject Matter Subtotal		27-31
Depth Subject Matter		
Core Coursework		
Statistics		24
STA 106	Applied Statistical Methods: Analysis of Variance	

STA 108	Applied Statistical Methods: Regression Analysis	
STA 130A	Mathematical Statistics: Brief Course	
STA 130B	Mathematical Statistics: Brief Course	
STA 138	Analysis of Categorical Data	
STA 141A	Fundamentals of Statistical Data Science	

Restricted Electives

Choose three:		12
STA 104	Applied Statistical Methods: Nonparametric Statistics	
STA 135	Multivariate Data Analysis	
STA 137	Applied Time Series Analysis	
STA 141B	Data & Web Technologies for Data Analysis	
Only one of STA 141B or STA 141C can be used as an elective.		
STA 141C	Big Data & High Performance Statistical Computing	
Only one of STA 141B or STA 141C can be used as an elective.		
STA 144	Sampling Theory of Surveys	
STA 145	Bayesian Statistical Inference	
STA 160	Practice in Statistical Data Science	
MAT 168	Optimization	
With advisor approval, one of STA 194HA or STA 194HB or STA 199 may be used as an elective. The course must be taken for four units.		
STA 194HA	Special Studies for Honors Students	
STA 194HB	Special Studies for Honors Students	
STA 199	Special Study for Advanced Undergraduates	

Cluster Electives

Choose four upper division elective courses outside of statistics:		12-16
Cluster electives are chosen with and must be approved by the major advisor. Electives must follow a coherent sequence in one single disciple/cluster where statistical methods and models are applied. At least three of the cluster electives must cover the quantitative aspects of the discipline. **A list of pre-approved electives can be found on the Statistics Department website.**		
Pre-Approved Electives List (https://statistics.ucdavis.edu/undergrad/bs-applied-track/electives/)		
Depth Subject Matter Subtotal		48-52
Total Units		**75-83**

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Course(s) discontinued; see your advisor for course options.

General Statistics Track

Code	Title	Units
Preparatory Subject Matter		
Mathematics		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3-4
or MAT 067	Modern Linear Algebra	
Computer Science Engineering		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ECS 036A	Programming & Problem Solving	
Statistics		
Choose one:		4
STA 013	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
STA 032 or STA 100 preferred.		
Preparatory Subject Matter Subtotal		27-28
Depth Subject Matter		
Core Coursework		
Statistics		24
STA 106	Applied Statistical Methods: Analysis of Variance	
STA 108	Applied Statistical Methods: Regression Analysis	
STA 131A	Introduction to Probability Theory	
STA 131B	Introduction to Mathematical Statistics	
STA 131C	Introduction to Mathematical Statistics	
STA 138	Analysis of Categorical Data	
Mathematics		16
MAT 108	Introduction to Abstract Mathematics	
or MAT 108V	Introduction to Abstract Mathematics	
or MAT 127C	Real Analysis	
MAT 127A	Real Analysis	
MAT 127B	Real Analysis	
MAT 167	Applied Linear Algebra	
Restricted Electives		
Choose three:		12
STA 104	Applied Statistical Methods: Nonparametric Statistics	
STA 135	Multivariate Data Analysis	
STA 137	Applied Time Series Analysis	
STA 141A	Fundamentals of Statistical Data Science	
STA 141B	Data & Web Technologies for Data Analysis	
Only one of STA 141B or STA 141C can be used as an elective.		
STA 141C	Big Data & High Performance Statistical Computing	
Only one of STA 141B or STA 141C can be used as an elective.		
STA 142A	Statistical Learning I	
STA 142B	Statistical Learning II	
STA 144	Sampling Theory of Surveys	
STA 145	Bayesian Statistical Inference	
STA 160	Practice in Statistical Data Science	
MAT 168	Optimization	
With advisor approval, one of STA 194HA or STA 194HB or STA 199 may be used as an elective. The course must be taken for four units.		
STA 194HA	Special Studies for Honors Students	
STA 194HB	Special Studies for Honors Students	

Code	Title	Units
STA 199	Special Study for Advanced Undergraduates	

Related Elective Course		*3-4*
One upper division course outside of Statistics approved by major advisor. The Related Elective should be in mathematics, computer science or cover quantitative aspects of a substantive discipline. **A list of pre-approved electives can be found on the Statistics Department website.**		
Pre-Approved Electives List (https://statistics.ucdavis.edu/undergrad/bs-general-track/electives/)		
Depth Subject Matter Subtotal		**55-56**
Total Units		**82-84**

Machine Learning Track

Code	Title	Units
Preparatory Subject Matter		
Mathematics		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
Computer Science Engineering		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ECS 036A	Programming & Problem Solving	
Note: Additional coursework in Python is strongly recommended; e.g., ECS 032B.		
Statistics		
Choose one:		4
STA 013	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
STA 032 or STA 100 preferred.		
Preparatory Subject Matter Subtotal		27
Depth Subject Matter		
Core Coursework		
Statistics		36
STA 106	Applied Statistical Methods: Analysis of Variance	
STA 108	Applied Statistical Methods: Regression Analysis	
STA 131A	Introduction to Probability Theory	
STA 131B	Introduction to Mathematical Statistics	
STA 131C	Introduction to Mathematical Statistics	
STA 141A	Fundamentals of Statistical Data Science	
STA 142A	Statistical Learning I	
STA 142B	Statistical Learning II	
STA 144	Sampling Theory of Surveys	
or STA 145	Bayesian Statistical Inference	
Mathematics		4
MAT 167	Applied Linear Algebra	

Code	Title	Units
or MAT 168	Optimization	
Restricted Electives		
Choose three:		12
STA 104	Applied Statistical Methods: Nonparametric Statistics	
STA 135	Multivariate Data Analysis	
STA 137	Applied Time Series Analysis	
STA 138	Analysis of Categorical Data	
STA 141B	Data & Web Technologies for Data Analysis	
STA 141C	Big Data & High Performance Statistical Computing	
STA 144	Sampling Theory of Surveys	
STA 145	Bayesian Statistical Inference	
MAT 127A	Real Analysis	
MAT 128A	Numerical Analysis	
MAT 170	Mathematics for Data Analytics & Decision Making	
ECS 122A	Algorithm Design & Analysis	
ECS 158	Programming on Parallel Architectures	
ECS 163	Information Visualization	
ECS 165A	Database Systems	
ECS 170	Introduction to Artificial Intelligence	
ECS 174	Computer Vision	
With advisor approval, one of STA 194HA or STA 194HB or STA 199 may be used as an elective. The course must be taken for four units.		
STA 194HA	Special Studies for Honors Students	
STA 194HB	Special Studies for Honors Students	
STA 199	Special Study for Advanced Undergraduates	

Note: A course used to fulfill the core requirement cannot be used as an elective.

Depth Subject Matter Subtotal		52
Total Units		**79**

Statistical Data Science Track

Code	Title	Units
Preparatory Subject Matter		
Mathematics		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
Computer Science Engineering		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ECS 036A	Programming & Problem Solving	
Note: Additional coursework in Python is strongly recommended; e.g., ECS 032B.		
Statistics		
Choose one:		4
STA 013	Elementary Statistics	

or STA 013Y	Elementary Statistics	
STA 032	Gateway to Statistical Data Science	
STA 100	Applied Statistics for Biological Sciences	
STA 032 or STA 100 preferred.		
Preparatory Subject Matter Subtotal		27
Depth Subject Matter		
Core Coursework		
Statistics		36
STA 106	Applied Statistical Methods: Analysis of Variance	
STA 108	Applied Statistical Methods: Regression Analysis	
STA 131A	Introduction to Probability Theory	
or STA 130A	Mathematical Statistics: Brief Course	
STA 131B	Introduction to Mathematical Statistics	
or STA 130B	Mathematical Statistics: Brief Course	
STA 135	Multivariate Data Analysis	
STA 141A	Fundamentals of Statistical Data Science	
STA 141B	Data & Web Technologies for Data Analysis	
STA 141C	Big Data & High Performance Statistical Computing	
STA 160	Practice in Statistical Data Science	
Machine Learning		4
STA 142A	Statistical Learning I	
or ECS 171	Machine Learning	
Mathematics		4
MAT 167	Applied Linear Algebra	
or MAT 168	Optimization	
Restricted Electives		
Choose two:		8
STA 104	Applied Statistical Methods: Nonparametric Statistics	
STA 137	Applied Time Series Analysis	
STA 138	Analysis of Categorical Data	
STA 142A	Statistical Learning I	
STA 142B	Statistical Learning II	
STA 144	Sampling Theory of Surveys	
STA 145	Bayesian Statistical Inference	
MAT 128A	Numerical Analysis	
MAT 170	Mathematics for Data Analytics & Decision Making	
ECS 122A	Algorithm Design & Analysis	
ECS 158	Programming on Parallel Architectures	
ECS 163	Information Visualization	
ECS 165A	Database Systems	
With advisor approval, one of STA 194HA or STA 194HB or STA 199 may be used as an elective. The course must be taken for four units.		
STA 194HA	Special Studies for Honors Students	
STA 194HB	Special Studies for Honors Students	
STA 199	Special Study for Advanced Undergraduates	

Note: A course used to fulfill a core requirement cannot be used as a restricted elective.

Depth Subject Matter Subtotal	52
Total Units	**79**