

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 79, 83, 80, & 80.

Applied Statistics Track

Code	Title	Units
Preparatory Subject Matter		
<i>Mathematics</i>		
MAT 021A	Calculus (MAT 021A strongly preferred)	4
or MAT 019A	Calculus for Data-Driven Applications	
or MAT 017A	Calculus for Biology & Medicine	
MAT 021B	Calculus (MAT 021B strongly preferred)	4
or MAT 019B	Calculus for Data-Driven Applications	
or MAT 017B	Calculus for Biology & Medicine	
MAT 021C	Calculus (MAT 021C strongly preferred)	4
or MAT 019C	Calculus for Data-Driven Applications	
or MAT 017C	Calculus for Biology & Medicine	
MAT 022A	Linear Algebra	4
or MAT 067	Modern Linear Algebra	
or MAT 027A	Linear Algebra with Applications to Biology	
or BIS 027A	Linear Algebra with Applications to Biology	
<i>Computer Science Engineering</i>		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ECS 036A	Programming & Problem Solving	
<i>Statistics</i>		
Choose one:		4-8
STA 013	Elementary Statistics	
or STA 013V	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 013 or STA 013V or STA 013Y NOT recommended.		
STA 032	Gateway to Statistical Data Science	
STA 035A	Statistical Data Science I	
& STA 035B	and Statistical Data Science II	
STA 100	Applied Statistics for Biological Sciences	
<i>Domain Emphasis Prerequisites</i>		
Two introductory courses serving as the prerequisites to the chosen Domain Emphasis; see Domain Emphasis section, below.		7-8
Note: Additional coursework beyond this requirement may be needed to fulfill the Domain Emphasis prerequisites.		
Preparatory Subject Matter Subtotal		31-36
Depth Subject Matter		
<i>Core Coursework</i>		

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	
Advanced 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	
or MAT 168V	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	
Domain Emphasis		
Choose four upper division courses outside of statistics:		12-16
A list of pre-approved elective courses can be found at: Pre-Approved Applied AB Electives (https://statistics.ucdavis.edu/undergrad/ab-applied-track/electives)		
Depth Subject Matter Subtotal		48-52
Major GPA Requirements		
Minimum 2.0 GPA in UC Davis courses used in the major.		
Minimum 2.0 GPA in Upper Division UC Davis courses used in the major.		
Total Units		79-88

General Statistics Track

Code	Title	Units
Preparatory Subject Matter		
<i>Mathematics</i>		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	4

or MAT 067	Modern Linear Algebra	
or MAT 027A	Linear Algebra with Applications to Biology	
or BIS 027A	Linear Algebra with Applications to Biology	
<i>Computer Science Engineering</i>		
ECS 032A	Introduction to Programming	4
or ECS 032AV	Introduction to Programming	
or ECS 036A	Programming & Problem Solving	
<i>Statistics</i>		
Choose one:		4-8
STA 013	Elementary Statistics	
or STA 013V	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 013 or STA 013V or STA 013Y NOT recommended.		
STA 032	Gateway to Statistical Data Science	
STA 035A & STA 035B	Statistical Data Science I and Statistical Data Science II	
STA 100	Applied Statistics for Biological Sciences	
Preparatory Subject Matter Subtotal		28-32
Depth Subject Matter		
<i>Core Coursework</i>		
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	
or MAT 167V	Applied Linear Algebra	
<i>Advanced Electives</i>		
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	
or MAT 168V	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	
Related Elective Course		3-4
One upper division course approved by faculty advisor. A list of pre-approved electives can be found at:		
Pre-Approved Electives List (https://statistics.ucdavis.edu/undergrad/bs-general-track/electives)		
Depth Subject Matter Subtotal		55-56
Major GPA Requirements		
Minimum 2.0 GPA in UC Davis courses used in the major.		
Minimum 2.0 GPA in Upper Division UC Davis courses used in the major.		
Total Units		83-88

Machine Learning Track

Code	Title	Units
Preparatory Subject Matter		
<i>Mathematics</i>		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	4
or MAT 067	Modern Linear Algebra	
or MAT 027A	Linear Algebra with Applications to Biology	
or BIS 027A	Linear Algebra with Applications to Biology	
<i>Computer Science Engineering</i>		
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.		
<i>Statistics</i>		
Choose one:		4-8
STA 013	Elementary Statistics	
or STA 013V	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 013 or STA 013V or STA 013Y NOT recommended.		
STA 032	Gateway to Statistical Data Science	
STA 035A & STA 035B	Statistical Data Science I and Statistical Data Science II	
STA 100	Applied Statistics for Biological Sciences	
Preparatory Subject Matter Subtotal		28-32
Depth Subject Matter		
<i>Core Coursework</i>		

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	
or MAT 167V	Applied Linear Algebra	
or MAT 168	Optimization	
or MAT 168V	Optimization	
<i>Advanced Electives</i>		
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 119	Data Processing Pipelines	
ECS 122A	Algorithm Design & Analysis	
or ECS 117	Algorithms for Data Science	
ECS 158	Programming on Parallel Architectures	
ECS 163	Information Visualization	
ECS 165A	Database Systems	
or ECS 116	Databases for Non-Majors	
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 a core requirement cannot be used as an elective.		
Depth Subject Matter Subtotal		52
Major GPA Requirements		

Minimum 2.0 GPA in UC Davis courses used in the major.
 Minimum 2.0 GPA in Upper Division UC Davis courses used in the major.

Total Units **80-84**

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	4
or MAT 067	Modern Linear Algebra	
or MAT 027A	Linear Algebra with Applications to Biology	
or BIS 027A	Linear Algebra with Applications to Biology	

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:		4-8
STA 013	Elementary Statistics	
or STA 013V	Elementary Statistics	
or STA 013Y	Elementary Statistics	
STA 013 or STA 013V or STA 013Y NOT recommended.		
STA 032	Gateway to Statistical Data Science	
STA 035A & STA 035B	Statistical Data Science I and Statistical Data Science II	
STA 100	Applied Statistics for Biological Sciences	

Preparatory Subject Matter Subtotal 28-32

Depth Subject Matter

Core Coursework

Statistics		36
STA 106	Applied Statistical Methods: Analysis of Variance	
STA 108	Applied Statistical Methods: Regression Analysis	
STA 131A or STA 130A	Introduction to Probability Theory Mathematical Statistics: Brief Course	
STA 131B or STA 130B	Introduction to Mathematical Statistics 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 STA 142B	Statistical Learning II
or ECS 111	Applied Machine Learning for Non-Majors
or ECS 171	Machine Learning

Mathematics 4

MAT 167	Applied Linear Algebra
or MAT 167V	Applied Linear Algebra
or MAT 168	Optimization
or MAT 168V	Optimization

Advanced 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 119	Data Processing Pipelines
---------	---------------------------

ECS 122A	Algorithm Design & Analysis
or ECS 117	Algorithms for Data Science

ECS 158	Programming on Parallel Architectures
---------	---------------------------------------

ECS 163	Information Visualization
---------	---------------------------

ECS 165A	Database Systems
----------	------------------

or ECS 116	Databases for Non-Majors
------------	--------------------------

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 an advanced elective.

Depth Subject Matter Subtotal 52

Major GPA Requirements

Minimum 2.0 GPA in UC Davis courses used in the major.

Minimum 2.0 GPA in Upper Division UC Davis courses used in the major.

Total Units **80-84**

Sample academic plans can be found on the Department of Statistics website; see below. These plans can be used as a guide, but students are recommended to meet with an advisor on a regular basis to make a customized plan that works best for their unique needs and priorities.

Sample Academic Plans

- B.S.-Applied Track (<https://statistics.ucdavis.edu/undergrad/bs-applied-track#plan>)
- B.S.-General Track (<https://statistics.ucdavis.edu/undergrad/bs-general-track#plan>)

- B.S.-Machine Learning Track (<https://statistics.ucdavis.edu/undergrad/bs-machine-learning-track#plan>)
- B.S. Statistical Data Science Track (<https://statistics.ucdavis.edu/undergrad/bs-statistical-data-science-track#plan>)